GARDEN CITIES
IN
THEORY AND PRACTICE

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GARDEN CITIES IN THEORY AND PRACTICE

BEING AN AMPLIFICATION OF A PAPER ON

THE POTENTIALITIES OF APPLIED SCIENCE IN A GARDEN CITY

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63645

BY

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VOLUME I.

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Roads are many; authentic finger-posts are few.

'Justice exacts that those by whom we are most benefited should be most honoured.'—DR. JOHNSON.

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PREFATORY

A STONE in the fulness of time, detached from the hillside and falling into a stream, may entirely alter the course of that stream; the deviation of the stream may entirely modify the formation of a whole country. This we know of the inanimate workers upon the face of our world. With animate workers a single book appearing in the fulness of time has more than once played the part of the stone. A book, detached from the hillside of accumulated knowledge, has been launched to oppose the stream of current events, and has turned them into a more beneficent channel.

I trust I may not be accredited with intemperate optimism if I venture the opinion that it is possible such a book—such a deviating-stone—may have been launched into an ill-directed stream, prepollent, if reinforced by the retaining wall of public opinion, to produce a great and beneficent change, and to open up a new vista in social, industrial, and national welfare. I refer to 'Garden Cities of To-morrow,' written by Mr. Ebenezer Howard.

I do not know that any apology is due from me for a work upon the same great subject, seeing that it is put forward in reinforcement of that to which I refer, except it be for its length, which has arisen from anxiety on my part to bring forward matter for consideration during the inception of the proposed Cities.

In connection with the labour entailed, I desire publicly to thank my assistant, Mr. Leonard R. Feltham, for the painstaking help he has afforded me, especially in regard to the compilation of statistics and the working out of the many calculations.

A. R. S.

LONDON,
April, 1905.

Earl Grey in a recent speech said: 'I can well remember receiving Mr. Howard's book in 1898, and the thrill of hope and pleasure I experienced as, under his guidance, I visited for a few happy hours the delightful realms of his Utopia; but I can also well remember the sigh with which I put away his book as outlining a scheme too far remote, as I then thought, from the field of practical politics to engage the serious attention of business men. I am happy to say I have changed my views. Having considered the scheme from every standpoint, my early scepticism has evaporated, and I now confess myself to be a convinced believer, given wise management, in the practicability of his plan.'

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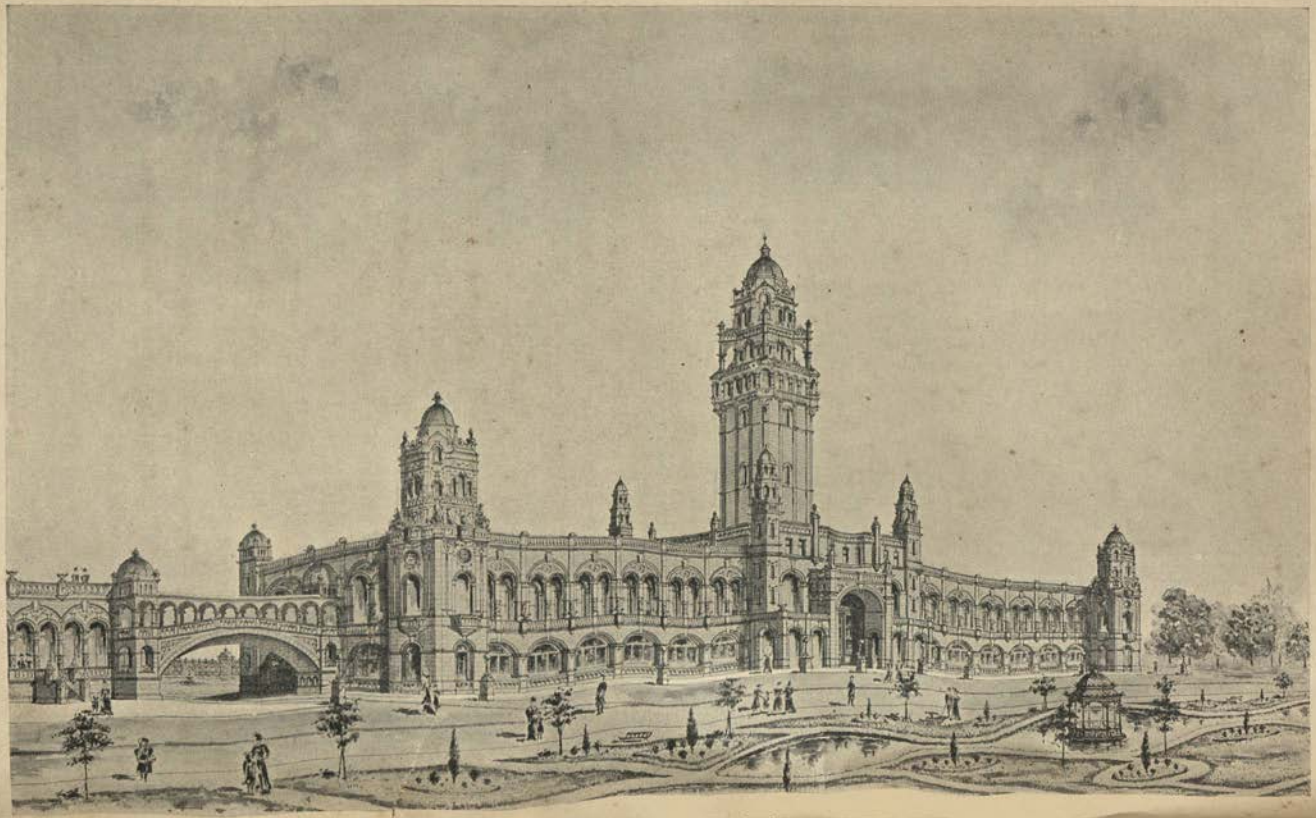


Design for the 'Capitol.'

Garden Cities

CHAPTER I

INTRODUCTORY

'A speck in the Northern Ocean, with a rocky coast, an ungenial climate, and a soil scarcely fruitful,—this was the material patrimony which descended to the English race—an inheritance that would have been little worth but for the inestimable moral gift that accompanied it. From Celts, Saxons, Danes, Normans—from some or all of them—has come down with English nationality a talisman that could command sunshine, and plenty, and empire, and fame.'

'A GARDEN CITY!' To the summer toilers in our smoke-beshrouded towns, half suffocated in their narrow, stagnant streets, half grilled by the reverberated heat of imprisoning buildings, overwrought and oppressed—how refreshing the name! To them what a vista of freedom, of light, of air, of sky! To them what chagrin! All around, umbrageous trees, verdant pastures, welling uplands, yet walls shut these out—shut them in. All above, the azure of limitless space—the canopy of heaven, its fringe descending to the soft carpeting of the countryside;

yet to them e'en this is denied, save for the narrow, sullied sky streaks delimited by their lofty, smoke-blackened roofs.

'A Garden City!' To the winter toilers in our fog-befouled hives of industry, grimy and mud-bespattered, jostling each other in semi-darkness, groping their workaday way 'neath a funereal pall of half-asphyxiating sulphur-laden vapour, the while wading ankle-deep in freezing mire, depressed and dejected—what chagrin! All beyond their dusky *ceinture* the country lies outspread in virgin purity, the crisp, exhilarating air is of crystal clearness, the ruddy, broad-faced sun—denied to them—throws o'er the white and spotless coverlet a roseate hue. As they regain their homes—be these the houses of the better-to-do or the fœtid tenements of the slums—well may they ask themselves, Was this ordained?

When the scientist, in his prolonged research, finds himself unrewarded by success, he knows he must have wandered from Nature's laws. He must retrace and search for the point at which he stepped aside from her guiding track; he must—he knows full well—walk along *her* roads; he must follow implicitly *her* direction posts. And so in life! the farther we wander from the guidance of Dame Nature, the farther we are from perfection; the more we deviate from *her* ways, the more precarious our progress. Artifice begets further artifice, out of each aberration springeth a further need to be ful-

filled, so that innovation should be tempered with discretion.

As we desert the lanes of Nature for the cities of artificiality, we desert quietude, happiness, and integrity for bustle, unrest, and insincerity. Contrast the modest, unaffected, truth-loving maiden, replete and content, in the charms of Nature's adorning, with the 'woman-about-town,' a creature of guile, artifice, and insincerity. The one charms and attracts us, rivets our belief in her sterling value, and secures our love; the other, ostentatiously displaying her tinsel seductions and demanding our admiration, fills us with distrust and secures nought but our contempt. Contrast the smiling countryside, the bright sheaths of golden sunrays lazily suffusing across emerald meadow and bronzed upland; flocculent wisps of just perceptible cloud calmly gliding high above the land, like idly-soaring gulls, to enhance the comfort of the land-toiler as they momentarily temper the ray to merge a tinge of gray with the whiteness of the chalky headland; the wind—if such a feeble, scented breath can so be called—with scarce strength to send a sluggish ripple o'er the golden plush of ripening corn and the erstwhile merry prattle of the babbling brook subdued to the hum of drowsy content—contrast this, I suggest, with the unrest, the clatter and roar of our frowning, grimed, noisy, noisome, never restful, repellent towns.

Nature, open and free, attracts us, claims our

reverence, our trust in her as our mother, our nurse, physician, and guide; entrances us by her natural charms, makes us long to linger with her. Towns, close, dense, and confined, are distasteful to us; we distrust their artifice; they command not our respect; we wish to quit them. Well would it be if we of animate nature possessed a fraction of the sincerity of the inanimate around us. We ask of ourselves the reason for the unfavourable contrast, and must reply, 'Because the one is nature-decreed environment, the other man-intruded artifice.'

Concentration of population in any one spot is unnatural. It commenced mediævally for unity of strength in depredative belligerency, that the dwellers might the better repel the onslaught *of* others; it continues to-day, for unity of strength in industrial warfare. This at once shows a necessity and points a remedy. If these agglomerations of populace be a necessity, and are at the same time repugnant to natural law, the remedy must be a compromise. The country must be made more like towns, the towns must be made more like the country.

What would a Garden City be but a beneficent compromise? It would indeed be a spot of country upon which the dweller could carry on his industrial and mercantile pursuits as in a town, a spot of country the advantages and beauties of which he could enjoy concurrently with his business and his labours. The master's town house would be his

country-seat; the clerk's a garden-surrounded villa, enlivened by the colouring of floral artifice merging into verdant nature; the artisan and labourer's tenement a complete *maisonnette* standing upon his allotment, where he might rest in his porch and survey the result of his leisure-spent cultivative handicraft.

The City would be a streetless City, devoid of breeze-barring rows and terraces; there would be no monotonous streets of made-to-match houses and cottages, nor beetling blocks. There would be no necessity to walk, or journey by tram-car, from home to business through interminable distances of roads and streets in which nothing is to be seen but brick and pavement, nothing to be heard but the eternal headache-imparting din and roar—diurnal and nocturnal—of endless vehicular processions, nothing to be smelt but the offensive odour of horse-drawn traffic, the exhalations of manure-sodden roads and streets.

In Garden Cities every house will be surrounded by a garden, the streets will be avenues delimited not by brick-and-mortar, but bordered by shade-giving trees, margined by widely-detached villas. The man of affairs will be able to reach his works or office a-foot if he will. His walk will be through a succession of gardens carefully tended like his own; his street will possess the quietude of the country; he will be exhilarated on his walk by the freshness of the air, charmed by the fragrance

of floral perfume, and cheered by the songs of birds.

Can anyone fail to appreciate the prepollence of all this upon health? The insufficiently changed and fœtid air of large towns—apart from it being pathogenically germ-laden—fails to efficiently oxygenate the lungs, hence fails to adequately purify the blood, and engenders a morbid and unhealthy habit of body. The 'stuffiness' of towns induces lassitude, the hard, unyielding pavements weariness, the absence of sun despondency—and despondency leads to drink.

The attributes of a Garden City would all tend towards the elevation of the moral tone of the inhabitants. That feeling of imprisonment, the constraining boundaries of interminable streets in our vast cities brings about, has the effect of warping and dwarfing the mental views and conceptions. To diminish this and to dispel the despondency one flies to the country. There the contrast is exhilarant: the breast expands with an aspiration and sigh of gratitude, the soul is liberty-elated, yet the drowsy tranquillity induces a sense of repose—but happily

> 'The sweet silence
> Forbids the mind to view with careless eye
> Creation's works, or uninstructed gaze.'

The most difficult problems of hygienic science arise from the unnatural conditions to which great towns give rise. Specific trades, of course, bring

about specific pathological conditions; the health of the workers is affected in one way by this operation, in another way by that—trade diseases one cannot touch upon here—but it is safe to say that in *every* instance the detrimental effect upon health is accentuated by life in great towns. The natural and wondrous auto-adjustment and marvellous recuperative ability of the human frame is greatly interfered with through lack of fresh air. Purification does not proceed hand-in-hand with defilement; from lack of open-air exercise arises morbidity of functionment. Thus the faithful Hygeia, in her strenuous and beneficent endeavour to carry out the dictates of her father Æsculapius, finds herself outmatched.

This has now continued sufficiently long to have a marked effect upon the *physique* of the town-dweller, and it is obvious the longer it goes on, and the greater is the size attained by towns, the greater the evil will become. One of the most notable features in connection with sanitary science and its relation to national health during the past year has been the great crusade against *phthisis*. The increase of consumptive inhabitants, indeed, has given rise to grave uneasiness, and, after most careful study upon the part of physicians, what has been the antidote proposed? The establishment of *open-air* sanatoria. With a galaxy of charitable units in our population—in this instance most notably amongst capitalists—the war against

phthisical degeneration has commenced in earnest. For, thanks to the continuous and personal interest taken in this transcendentally important problem by His Majesty, to the magnificent munificence of such men as Sir E. Cassell (London), Mr. W. H. Hartley (Liverpool), and Mr. W. J. Crossley (Manchester), our great towns are now being provided with hilltop *sanatoria*.

Correct in principle and benign all this undoubtedly is, but reflection will show that the onslaught upon the oncoming army of disease is being directed against it at the wrong point. We are attacking it at its strongest, instead of its weakest, point. We are aiming at cure, instead of prevention. The time and place, when and where, to make the attack are obviously, the one, during childhood and youth, the other, in our large towns, concurrently with the daily occupations of the poorer inhabitants. The first essential of ventilation and means of supplying rooms and factories with pure and fresh air is that that vital element should *exist outside*, ever ready to suffuse within the buildings.* Hence 'Garden Cities'—if properly carried out—would of themselves constitute efficient *sanatoria*.

Then as to happiness! Man is a colligative, a phalanxive being, and urban life attracts him; hence, *primâ facie*, town should be his earthly paradise. The 'attractions' of cities have great gravitative influence—an element in the social con-

* See reference herein to the use of ozone.

The Effect of Anarchic Growth—a Hive of Industry—Newcastle-upon-Tyne.

View in an English Industrial Village.

View in an American Industrial Village.

formation of a country of far greater moment than many reformers are in the habit of attributing to it. It is assumed, for example, that if a factory of average dimensions be established in the country, and comfortable cottages for the workpeople be provided in the vicinity, the happiness of the small community thus formed would be complete. Engineers and other large employers of labour know by experience to the contrary. The class of operatives thus attracted are *not*, as might be thought, the skilful and more highly-paid artisans, but those occupying the lower rungs of the ladder of progress. Much difficulty is experienced in obtaining the more skilful; and, moreover, as those of the lower rungs move successively upward, and their wages are increased proportionately, they migrate to the larger towns; and hence, not only is the employer called upon for an undue amount of teaching, and to cope with constant change, but also he is robbed of those most important elements in the *esprit de corps* of his factory—'old servants.'

What, too, is the effect upon the little community? The change is inimical also to *its* interests. Good and faithful citizenship can only accrue from long residence; hence, as I have ventured to point out elsewhere, any scheme for the colonization of rural districts, to insure success, *must* be carried out upon a scale of some magnitude, and in its constitution must be embodied all such elements as are requisite and necessary to make

the colony *self-contained.* And of such elements those of ample recreation and adequate amusement must find place.

In the foundation of the 'First Garden City,' from every point of view—including that of the speedy realization of its ideals as well as its common weal, when established—it is highly desirable that its evolution should proceed from the establishment, in the first instance, of one or two large factories, rather than from a number of smaller concerns. And, from the facts I have just set out, I feel manufacturers will be justified in demanding an assurance that the development of the City will be carried out on broad and enlightened lines, embodying all the known requisites and amenities of a city of modern civilization. *Not*, as has been extraneously suggested, that those responsible should look to the manufacturers for the provision of sanitarily-built cottages and houses, of the amusements and of the desirable attributes of a modern city, the promoters contenting themselves with relying upon—as it has been most impractically suggested—the mere collection together of an assemblage of rural residents. This, a mere scheme of *land* development, would be unjustifiable in face of the strong propaganda—comprising the great social problems of transcendental importance, the prevention of further overgrowth and overcrowding of our large towns, and the provision of better and more healthy homes for their vast working populations—

that has been set forth concerning the project and its national importance.

If, on the other hand, the 'First Garden City' shall be established upon such lines, not only of financial soundness, but of sympathy-attracting enterprise, with proper provision for autonomy, automatic subsistence, and continuity of industrial occupation, so that in it may be discerned the progenitors of others spreading themselves over the face of our land—then, I am persuaded, will not alone its success be assured, but that that measure of support, not only upon the part of manufacturers, but also upon that of the public, will be accorded to it proportionately to its great merits as a beneficent scheme—proportionate, also, to its progressive importance.

To be of national importance and to command the attention of statesmen, social reformers, political economists, and, lastly, but by no means of least importance, investors and financiers, such a scheme must carry upon its face the imprint of sound commercial principle, and, moreover, be able amply to justify any claims it may put forward as to its ability to bring into being a community at once independent, solvent, and self-supporting—a community, moreover, which shall be composed of all the effective elements and working units of which an industrial community must be constituted, in order to make its subsistence *quasi* non-dependent and automatically productive.

The mere colonization of a rural district by the transportation thither of the human contents of the 'slums' of great towns by no means realizes the ideal. Such a generic transplantation would possess little of the essentials of self-dependence, and but slender hope of sturdy intrinsic growth, which alone can spring from efficient, unaided, automatic functionment.

Under existing social conditions such a community, no matter how small, must, from the beginning, be composed of all the units of which older and larger cities are built up; every grade of social status must be represented, so mutually dependent has become class upon class. To illustrate what is here sought to be conveyed, let us assume the sudden springing into existence of a city built in accordance with the dictates of modern science, and replete with all means of recreation, self-improvement, and intellectual amusement, and that this then be populated with the transported contents of town slums. Not only would such a population be quite incapable of carrying on the industrial work of such an ideal city, but the facilities for recreation, self-improvement, and intellectual amusement would be almost wholly wasted.

To render the colony non-dependent upon extraneous support and automatic in its working, the skilled artisan must be there beside the erstwhile slum-dweller—his labourer—the master man, the small employer of labour, the large employer above

him, and the professional man; every grade of worker must be found within its demesne; whilst a little consideration will serve to show that advantages would also accrue from the presence of the private resident.

Then, and only then, could the facilities provided be fully appreciated and taken due advantage of; and then, and not till then, would there be hope that the intellectual status of the erstwhile slum-dwellers could gradually, and without unwholesome 'forcing,' be raised, so that they could appreciate, conform to, and reap advantage from sources which, from the first, the more advanced and higher intelligenced artisan would have been able to appreciate and reap the benefit of.

If these premises be correct—and the want of success of uni-generic colonization would seem to point to this—then it may be laid down as an axiom that no scheme of rural colonization is likely to be successful unless it can from the first be carried out upon a scale of considerable magnitude.

That scheme, moreover, will be the most successful in which the idiosyncrasies of classes, and also the susceptibilities of human nature, have been the most carefully gauged and provided for.

Difficulties and dangers there will be!—obstacles to progress such as will have to be surmounted with the pliant foot of discretion planted firmly upon the solid rock of determination. Of these dangers, none is more ominous than those which may arise from

the desire for class preponderance. It takes no great prophetic prescience to foretell that if ultra-democratic principles are to obtain, the scheme is doomed to dismal failure; no health conditions can save it, no architectural beauties could render tolerable life in a newly-constituted community in which the sound of socialistic shriekings would be ever present. No matter how bold and beneficent the conception, such a city would be shunned—not sought after. But the conceptions of such a community never could be bold and nationally beneficial. A community whose highest aspirations are a dead level of equality, and hence mediocrity; a community who assess the value of the industrious artisan at only that of the laziest lounger, who think wages are to be raised by the inculcation of idleness, who clamour for cheap and commodious dwellings, and forthwith instruct their bricklayers—under pain of penalty—not to lay more than a certain number of bricks per diem; a community to whom the spirit of emulation is entirely unknown, a mass of human units of profound, sordid, and short-sighted selfishness; a community in which respect for energy, ability, and success is conspicuously absent, is one in which the pleasures of well-doing and the delights of ministration to the welfare of others cannot be experienced.

To give scope for amplification of these vicious principles, so inconsistent with true economics, so grossly unpatriotic, and so surely trending to

national disaster, would be little short of criminal; whilst the downfall of the City, which under the vaunted rule of *equality* would be a hot-bed of disaffection—like the Parisian abodes of *égalité*—would be but justly merited retribution. From personal experience, I am persuaded that these sentiments, forced into the mouths of trades-union men by paid agitators, and attributed to the British workmen as a whole, are not shared in by the truly conscientious and honest operatives. Men of this type, indeed, seceded in large numbers. They probably felt the wisdom of the Biblical admonition, 'Man cannot serve two masters.'

Yet this is what the union-ridden workman is called upon to do. Masters have long since appreciated that it is to mutual interest to ameliorate the condition of workmen, but this has not met with the reciprocity it merits. There are instances, however, within my own personal knowledge of the most cordial relations between men and master, even when the operatives of a single works number several thousands; yet nevertheless the master and his sons are in immediate contact and concert with every individual man, and the men appeal to them for advice on matters the most private and domestic. But such instances are works where the baleful influence of disaffection-imparting unionism has not been allowed to find place—not those in which a certain portion of the weekly wage is paid away for purposes inimical to the

interests of the master. One cannot serve two masters.

In principle, a properly organized union of workmen for their joint welfare is a laudable project; and it is significant that not only did employers welcome such, but no suggestion of a similar federation of employers was ever heard of until after the outrageous encroachments upon the private working of their establishments and oppressive, insensate opposition to common-sense economics of production, whereby British factories were put at a disadvantage with those of other countries, culminated in the great and disastrous strike of 1897. Then, and not until then, was an Employers' Federation brought into being.

Since that date things have gone more smoothly, but it must never be forgotten that where 'piecework' is impracticable, Great Britain still suffers under the accursed inculcation of the unionist placeholders, that idleness and waste of time on the part of those employed may make room for those unemployed. Needless to say, the effect of this dishonest policy has been a considerable rise in the price of almost all home-produced goods; but that of foreign production remaining the same, or, indeed, being decreased, our manufacturers have been unable to sustain the competition and works have been closed. Thus, in seeking dishonestly to make places for their co-workers, or co-idlers, many operatives lost their own.

Immediately after the great strike to which I have referred, I had occasion to visit several of our great ship-yards, and I there saw the most degrading sight I had ever seen in my life, the spectacle of sullen workmen studiously endeavouring to waste as much of their time as they possibly could without actually subjecting themselves to dismissal.* What, it may be asked, is to be done under these deplorable conditions, as hostile to the true interests of the workmen as they are inimical to national prosperity? What, it might be added, can be done to protect the honest workman and to facilitate *his* advancement? The answer is obvious: *Employ him*, and do not make his life a burden to him by setting him to work alongside a unionist, who will jeer at him for his conscientiousness, and by entreaties, threats, and boycotting endeavour to force him to take a course against his convictions.

Can 'First Garden City' take part in this

* A most eloquent testimony to the national as well as industrial effect of this cheating system was given by one of the present directors of the 'First Garden City Company,' Mr. W. H. Lever, who said that whilst the cost of material remained about the same, the workpeople's dwellings erected in the village of Port Sunlight had become much more expensive to build. I give his own words, uttered last year at a meeting of the Architectural Association: 'Our standard type of cottage thirteen years ago cost us £200 each to build, and identically the same cottage in 1901 cost us £330 to build. The parlour houses cost us then about £350 each to build, and now abont £550 each.'

necessary and beneficial work? I would reply that it is particularly well-circumstanced to inaugurate a change which might subsequently have the most far-reaching and Empire importance. The Hertfordshire Garden City will only accommodate, as a maximum, some 5,000 factory operatives, of whom, perhaps, some 3,000 will be men. Why not give 3,000 honest workmen a fair start, a fair chance to show what they are made of, a chance to demonstrate how they can turn to good account the special amenities of the City, the recreative advantages it is intended shall be provided for them? In place of huge and unwieldy unions run by highly-paid agitators, offer them 'mutual benefit associations' and 'mutual improvement societies,' headed by *men* of their own acquaintance, working for *their* good gratuitously—societies from which the subscribers shall receive benefits in their own town, not societies in which their hard-earned money is frittered away at the nethermost ends of the kingdom in huge quarrels arising out of petty misunderstandings, which could have been adjusted in twenty-four hours had the workmen been *allowed* to approach their masters individually. To effect this, neither effort nor expense is necessary, but merely to employ only non-union men.*

* A simple means of procuring them is to embody in the rules of the establishment some slight deviation from those *allowed* by the particular union, whereupon men who may have surreptitiously 'taken on' as non-unionists will be withdrawn. (See also 'Industrial Zone.')

I have touched thus much upon unpleasant topics because I already detect the murmurings of socialistic ebullition, the voicing of ultra-democratic views and denouncements. It is with deep regret, as well as solicitude for such a good cause, that one hears the reiterated invective directed against landlords and capitalists. Surely such a course is as suicidal as it is inconsistent and stupid. What sort of figure does the socialistic reformer present in to-day, denouncing the landowner and to-morrow, approaching him to join him in his enterprise? What consistency and probability of success in to-day, vilifying the capitalist and to-morrow, going, hat in hand, to beg for his money? I cannot but feel that the indulgence in extremes, the thrusting forward of party and reformatory notions, and the clamouring for conditions far removed from established usage of to-day, will cause, in the result, alienation of sympathy and retardation in much-to-be-desired realization, and this must be my apology for bringing them forward.

That strenuous, conscientious, and well-directed effort *should* be made, and this without delay, to neutralize the evil effects of overgrown populations, is clear; of this no doubt can exist in the unbiassed minds of all thoughtful persons. Lord Grey, in a recent speech, said: 'It is admitted on all hands that most of the larger cities of England, owing to their ill-regulated and anarchic growth, have become the very cancers of our body politic, and that

they are sapping the strength and poisoning the character of the nation. No one who realizes that physique and character are the products of environment, as well as heredity, can fail to regard the suburban excrescences of our smoke-enveloped and air-exhausted towns with feelings short of positive consternation. Streets upon streets of sunless slums, with nothing to relieve their squalid and depressing monotony; little provision for recreation beyond that which is supplied by low music-halls and still lower public-houses; boys turned out of school at fourteen years of age, and no organized influence to mould them into honest citizenship at the age at which their characters are most impressionable—these are the evils with which we have to contend, and unless some effective steps are taken to counteract their influence on the character and temperament and physique of our people, the manhood of our nation must deteriorate, and we shall not be able to retain our present leading position in the world.'

The questions giving rise to anxiety and exercising the minds of those who wish to see a conscientious attempt made to remedy the evils undoubtedly obtaining, and thus referred to by Earl Grey, are whether were a to witness an immediate modification and inceptive amelioration of the evil conditions by means of the building of a city sheltering a community whose daily life—*whilst being entirely free from all the evils of overcrowding*—shall be carried on under conditions

otherwise so nearly approaching to what long periods of evolution and our existing modes of life, municipal control, and established usage now, to-day, show to be desired by and acceptable to the populace—in which case *success is assured;* or whether, for the gratification of a small minority, drastic, unnecessary, and uncalled-for reform, undesired by the majority, is to be introduced, which must—of its nature—inevitably lead to failure. By failure I do not mean to imply the failure of this first proposed City *per se;* I mean failure in true advance in solving a gigantic problem, failure to further a change of national and world-wide moment and importance.

I should account it *entire failure* if, for example, the Hertfordshire City became an *unqualified success,* from the point of view of a community attracted thereto by reason of their holding extreme views—views which could be neither acquiesced in nor shared by the nation at large. What good would have been done if it became rapidly filled to its utmost capacity by a people who lived and moved, had their being and governed themselves in a manner discordant to the views and tastes of the vast majority of our *forty millions?* This has already been achieved many times—the 'Shakers,' to wit! Was *their city,* their successful object-lesson, a success? Obviously not! for the, more than sufficient, reason that it never was followed. The self-satisfied inhabitants might reasonably say—from their point of view—'Then leave us alone.' Therein would be evinced

failure. Other communities have already been left severely alone, and have in due course *decayed.* That is precisely what we wish and *hope not* to see. Such 'success' would be not only *failure,* but would be retrogression, instead of progress, in solving a great problem. What good has ever come from the many and varied establishments and colonies of aberrant peoples? Naught but retrogression—a recurrent phase, as it were, in social evolution. What have the various 'cities of associated labour,' for example, been but complete failures, until the tenets of established usage were subsequently had recourse to? What tangible result have we to-day from the various 'industrial colonies' which have cost *millions?* It cannot be gainsaid that *nine-tenths* of these millions have been wasted—*cui bono?* A successful slum-emptying device philanthropically supported, and thus incapable of automatic sustenance, would, from the same point of view, be a complete *failure.*

In making these hypothetical objurgations I feel I justly call down upon myself the demand to explain what, then, I *should* consider as success. One feels no embarrassment in offering a reply. I should deem as *unqualified success* the establishment in a Garden City—a city which can never become overcrowded—of a community of 20,000 or 30,000 people whose social *status* would be respected as it is outside the ideal cincture; a community wherein those of each *status* might live their lives as they thought befitting their station, tranquilly and out of earshot

of the sect-shrieked cry of 'equality'; a community in which he or she would be left free as to position not only in regard to land, but as to neighbours, and not forced to live, in heterogeneous style, with those of all ranks; a city which should be divided up in proper and proportional accord with social requirements; a spot of the earth where one could exist as upon a terrestrial 'chess'-board, as it were, whereon the community might engage themselves in the game of life, where skill might capture rank, where the pawn, by perseverance, might cross the difficultly obstructed board and merit win the game. Not, I say, upon a 'draughts'-board where *all* are pawns. Finally, a community whose condition—*whilst approximating to other and existing communities*—should be so improved, and thus made so enviable, that vast numbers more than it could hold should desire entrance. A city that, in its industrial needs, should empty a *due proportion* of the *slums* of other cities wherewith to furnish its *slumless* village. I should esteem the success of such a model city as unqualified—as almost Utopian, if it could be firmly established upon self-supporting lines *as to every rank*, so that it should afford *data* whereby to calculate just how many more such cities would be required to empty *all* the slums of *all* our overcrowded cities. He who, by incitation, shall build such a city will, at the same time, have built a monument for himself!

One-half of a paragraph from Buckingham will

serve to sum it all up. A city which should 'unite the greatest degree of order, symmetry, space, healthfulness, the largest supply of air and light, and the most perfect system of drainage, with the comfort and convenience of *all classes*, and the due proportion of accommodation to the numbers and *circumstances of various ranks*.'

One feels constrained to dwell upon this question —of vital and paramount import to success, because not only has this matter of absolute equality—of levelling up and levelling down—been already advocated—but it has even been suggested that the land should be plotted out almost equally per inhabitant; and, furthermore—this the most inimicable of all to inceptive success—that absolutely no division into districts in regard to classes and social *status* should be tolerated.

Concerning the mode of laying out of the City, the recommendation has actually been—unofficially —put forward that no distinction should be made between the *locale* of the dwellings of the various classes of which a successful community must necessarily be made up—a suggestion occasioning me the greatest surprise, for were it carried into effect, it would be grossly unfair to *all*, especially the poorer. Such a thoughtless innovation, if attempted, will go far to wreck all prospects of success, and if persisted in will assuredly have that result.

In London—a city quite apart in many ways—we find those of the highest rank living in touch

with some of the poorest, for it is inevitable, yet I have never heard any complaint upon the part of the former. I have, however, heard many, and bitter, complaints on the part of the latter of the invasion of what they consider—and I think very rightly consider—the demesne they might at least be allowed to deem as their own. Take, for example, the matter of public recreation. The richer have never, to my knowledge, openly objected to the invasion of the spaces and parks they themselves use by the poorer. But such use, by the latter, is usually confined to Sundays. The workaday world can then don their best clothes and disport themselves in a becoming manner and enjoy all the advantages which, during the week, the more favoured had been able to enjoy if they chose. The majority of the more favoured will be pleased to see them there, so long as their behaviour is such as it should be, and those who may not view things in that light have the ready alternative of themselves staying away the one day in seven. But why should the workaday world be debarred from such enjoyment in their workaday clothes *every* evening of the week? Their enjoyment would be marred by the distinction thus made apparent. Why should they not have their own park—the people's park, as they love to call it? Why should they not be allowed to enjoy themselves with their *own* comrades and in their *own* way? They argue, and with some reason, the richer can drive away—

can travel—but they cannot. Yet the reformer of extreme views endeavours to thrust each class together, thus, as I affirm, forcing disaffection upon both.

Again, in the matter of dwellings, the carrying out of the suggestion would introduce serious difficulties not only in the laying out of the cities, but in the architecture and æstheticism of that which it had been hoped would prove as standing models of these sciences. I shall unfortunately have to prove later that it will be quite impossible to provide commercially, and within the means of the working man, houses of such artistic merit as one occasionally sees erected by the rich for their dependents merely from motives of artistic sentiment, or, again, in philanthropically-produced model villages. This may be regrettable, but it is stern fact. Why, then, should the work of those who are prepared to pay for and to contribute by their own residences to the beautification of a city for the *benefit of all classes* have the beauty of their own district marred by the presence of that which cannot be beautified?

Turning again to the side of the workman, why should he be separated from his *confrères?* Why *always* called upon to pay his respects to his superiors whenever he moves abroad? Why *always* compelled to be, so to speak, 'upon his best behaviour,' and not allowed to retire, as it were, within himself and the bosom of his *coterie?* He

will ask, The rich can do this, and why not I? All should ask themselves, Why not?

In leaving his cottage in the morning, why should he not be allowed to feel that he is on an equality with all he surveys, with all that environs him? In returning in the evening, why should he not be allowed to feel with Goldsmith that—

> 'Though poor the peasant's hut, his feast tho' small,
> He sees his little lot, the lot of all;
> Sees no contiguous palace rear its head
> To shame the meanness of his humble shed;
> No costly lord the sumptuous banquet deal
> To make him loathe his vegetable meal.'

This forcing of the workman out of his sphere, doubtless intended as kindness, is in reality cruelty. It is with one hand offering a mundane gift, which cannot be given, with the other taking from him a heaven-born gift—the spirit of contentment.

To educate is to bless, but only if it tends to bring content. If the advent of the one is to dispel the other, then would it be better to leave Nature alone, to leave man alone, and in that state when—

> 'Calm and bred in ignorance and toil,
> Each wish contracting, fits him to the soil;
> Cheerful at morn he wakes from short repose,
> Breathes the keen air and carols as he goes.'

If instead of agitating for 'improvement' in social *status* and the creation of a new situation, all efforts were directed to improvement of existing conditions, to the enhancement of happiness and content as

things obtain to-day, then would that constitute true and practical kindness. 'The most helpful and sacred work,' says Ruskin, 'which can at present be done for humanity is to teach people (chiefly by example, as all best teaching must be done), not how "to better themselves," but how to satisfy themselves. . . . And in order to teach men how to be satisfied, it is necessary fully to understand the art of joy and humble life—this, at present, of all arts or sciences, being the one most needing study. Humble life; that is to say, proposing to itself no future exaltation, but only a sweet continuance; not excluding the idea of foresight, but wholly of foresorrow, and taking no troublous thought for coming days; so also not excluding the idea of providence or provision, but wholly of accumulation—the life of domestic affection and domestic peace, full of sensitiveness to all elements of costless and kind pleasure; therefore chiefly to the loveliness of the natural world.'

This, so poetically put, is, I contend, what should be striven after, not only by reason of its benignity, but because it is within the bounds of our social economics, and I know not of any scheme so prepollent and practical to see it carried out as by the establishment of Garden Cities.

A sacred and monumental work, indeed, it would be if in such a City were found, not only apposite and sanitary habitations, humble dwellings embellished with costless art, with elevating and

refining taste, but furnished with that sweet spirit of content which should cause their occupants to say:

'Here reigns content,
And Nature's child Simplicity, long since
Exil'd from polish'd realms. Here ancient modes
And ancient manners sway; the honest tongue
The heart's true meaning speaks, nor masks with guile
A double purpose; industry supplies
The little temp'rance asks, and rosy Health
Sits at the frugal board.'

This suggestion of jumble and chaotic agglomeration was put forward, within my own knowledge, by a physician. Asked what was his argument, his rejoinder—of the most feeble—was, 'Because in existing large towns the sanitary condition of the poorer districts was not equal to that of the more wealthy'! Asked *why*, in a Garden City, a town to be entirely new from drain-pipe to chimney-pot, the sanitary *arrangements* of those portions set apart for the poor should not equal those of the rich, he could see no reason whatever. Asked if he felt the poor already had had inculcated into their minds and thoroughly *appreciated* and *understood* the principles and importance of sanitary measures, he replied, '*Far from it.*' Why, then, I would ask, with all the force at my command, should—merely to gratify the isolated, ill-thought, ill-restrained sentiment of a small but loud-voiced minority—why, I say, should the richer man be *compelled* to have his

dwelling next door to the poorer? Why should his ears, and those of his wife and daughters—more refined than those of his neighbours—be offended by *their* conversations pitched in a key in the *gamut* of social advance more in harmony with the bass than the treble of social evolution? Why should his children be compelled to play alongside those less carefully taught the scales of refinement? Why exposed to dangers arising from their admitted lesser appreciation, and consequent caution, in regard to sanitary conduct?

The answer is not far to seek. The self-respecting would *decline;* this for the very sufficient and logical postulate that no *raison d'être* has been made out, nor, indeed, attempted, in any sincerity, to be made out.

Surely it were better exercise of 'common-sense' to provide the 'lesser informed' with all that science can provide for their health and recreation, and by inspection, inculcation, and the exercise of patience, to minister to their welfare in the hope that, in fulness of time, the degree of discrepancy may be reduced—in the hope, if you wish, that with evolution will be wrought that transference of refinement which shall bring about the *equality* which, rightly or wrongly, is thought in some quarters to be so desirable. An equality I, for one, should never hope to see, because it is obviously not in accord with natural law, because its artificial production would be disastrous to the natural functionment of

the world we live upon; nay, it were not too much to say that the influence of an assumed but unreal and premature degree of equality both in regard to men and women is *already* being disastrously felt.

'The further you go from Nature the more imperfect you become,' I have ventured to suggest, and in this I am eloquently rebutted in the impracticability of the scheme by the Latin proverb, *Naturam expellas furcâ, tamen usque recurret* (Though you drive out Nature with a club, yet will she always return). The lion is feared by the cub, who hopes some day to rival him in thew and muscle and prowess; the eminent professor is feared yet revered by the student, who hopes one day to become his intellectual equal. In like manner the workman should respect his master, in whose place he may fairly hope to sit in good time. Place the standard of cub and lion, student and teacher, man and master, as *equality*, and you have—*chaos*. Make all the units and atoms of the whole mass equal in magnitude and of equal importance, and you get—*disintegration*.

In reviewing revolutionary 'projectors' of the most extreme views, one cannot help drawing analogy between them and the alchemists of old. These ancient experimentalists were as strenuous, as indomitably persevering, and as capable of hope against hope, as their modern representatives of whom we now speak. The socialistic visionary of to-day puts forward this or that as the *universal solvent* for

every problem—to-day it is a concoction of this sort, to-morrow of another. The alchemist put forward this decoction and that decoction, always equally confident that he had discovered the *alcahist* or universal solvent for all substances exposed to its influence. Two other dreams, also, did they cherish! The first that they could turn the baser metals into gold, the second that they might be able to discover the water of immortality. The clever jugglery resorted to in the ancient has its counterpart in the plausibility of the modern, both being debased by predominant self-interest. The search for immortality was the more harmless, but was it the more prudent? An old writer in this relation observes: 'How lightly, after all, did they really estimate the misery of immortal life to an individual in the present world! An immortality of the beholding of suffering, sorrow, and sin, of withering hopes, dying friends, unsatisfying occupations—was this the object of their search?'

Were it not wiser, I would ask, to cast aside visions of the millennium, to cease striving for the unattainable within the short span of human existence, and concentrate upon ideas concrete, in the hope of immediate alleviation of pain and suffering? Though the scope of that realized might be narrower than that of the visionary, were it not better to do this than:

> 'To lose good days that might be better spent;
> To waste long nights in pensive discontent;

To speed to-day, to be put back to-morrow;
To feed on hope, to pine with fear and sorrow;
To fret their souls with crosses and with cares;
To eat their hearts with comfortless despairs:
Unhappy wights! born to disastrous end,
That do their lives in tedious tendance spend.'*

Such scheming for vast socialistic change will, I fear me, end but in delay. Concentration and well-directed effort, to moderate reform and immediate amelioration by everybody working shoulder to shoulder, will surely be the channels of work best calculated—by means of the opportunities now happily arising—to bring about good and speedy results.

I will dwell no longer upon this theme, because I am persuaded that the enlightened views of the men of the world, men of success, men of experience, who have, in most laudatory manner, and quite unremunerated, assumed the great responsibility of not only deciding upon such vital questions, but of conducting the affairs of a great innovation and enterprise, will exercise, in their discretion, such broad and worldly measures as will mitigate risks such as would be run by extremists.

It is therefore in the fact that connected with the project are men of known and tried commercial ability—men who themselves have found it to their own interests, as well as to the advantage of their employés, to lay out and build 'Garden Villages,'

* Spenser.

taking care to provide them with means of social recreation, amusement, and the amenities of cities—men who can be trusted to enter upon, and subsequently to direct, the undertaking in no niggardly spirit—who have come forward in that capacity, coupled with the fact that an approved tract of land of sufficient magnitude has been purchased, so as to enable that interweaving of intermural and extramural occupation, that interdependence of urban and agricultural industry, of which I shall have something to say later, to be properly carried on; it is in these things, I say, that I see success—success to be speedily achieved.

Whatever diversity of opinion may be possible concerning the management of these cities when built, there certainly can be none as to the unique opportunity they offer for building Cities of Health.

That great and revered hygienist and sanitarian, Edwin Chadwick, who passed away some thirteen years ago, many times said that he could build a city that would give any stated mortality, from fifty,* or any number more, to five, or perhaps some number less, in the thousand annually. It is also more than a quarter of a century since Dr. Richardson (afterward Sir Benjamin Ward Richardson, F.R.S.), described his proposed City of *Hygeia*, and he then said that he depicted nothing whatever but what was at *that moment* easily possible. The great physician set out with the

* See tables on mortality in Appendix.

proposition, 'What are the conditions which lead to the pain and penalty of disease? What the means for the removal of those conditions when they are discovered?'

It may therefore be interesting to recall his project, for it is obvious that what was possible then is more than possible now.

The population he placed at *one hundred thousand*, dwelling in *twenty thousand houses* built upon *four thousand acres* of land, thus giving an average of twenty-five persons to an acre.* This population, for the space occupied, he remarked, 'might be considered *large*,' but seeing that the effect of density on vitality tells determinately only when it reaches a certain extreme maximum—as in Liverpool and Glasgow—he ventured upon the estimate, feeling at the same time assured that the applications of science of the time would result in a death-rate of but 5 per 1,000.

To effect this, Dr. Richardson asked for little more than the exercise of common-sense in the design and

* In the following pages I am assuming thirty persons to the acre in the Village and an average of about half that number to the acre in the City. It may be interesting to compare this with the Metropolis. London, taken as a *whole*, has 56 persons to the acre; but this low average comes about through the great range of density in the vast Metropolis. Thus in some districts it is as low as 9. In others it rises to 1,000 and over. Indeed, one area (in Whitechapel) has a density at the rate of 3,000 persons per acre.

laying out of the City, and in the construction and furnishing of the dwellings. In regard to the latter, he certainly was severe; but his denunciation of fixed carpets—especially in bedrooms—excess of furniture, unnecessary draperies, wall-papers—especially arsenious ones—has indubitably been productive of much good. He cast Art to the winds in favour of Science. Progress, however, is generally effected by a compromise between what *is* and what *ought to be*; it is sincerely to be hoped it may be so in Garden City design rather than that the what *ought to be* should be left unintroduced by reason of it differing too materially from the what *is*.

Thus, we find the glazed brick walls and dados of Richardsonian stipulation compromised by the introduction of washable wall-coverings such as Anaglypta, Lincrusta Walton, and the like, and even sanitary (washable) papers; the glaze-tile frieze and the glaze-tile ceilings 'slightly arched' by ceiling coverings of Tynecastle tapestry, and the like. These substitutes are not nearly so hygienically perfect, but they constitute beneficent compromises between Science and Art. His suggestions, however, are at last being carried out in their entirety in regard to bath-rooms, lavatories, and suchlike. His denouncements of the useless labour of black-leading stoves and scouring steel-work have led to the introduction of tile stoves and grates, as also that of the unsanitary nature of fixed carpets to the adoption of movable 'squares' and detached rugs

surrounded by plain wood—in the bees-waxing of which, he pointed out, health-giving ozone was generated.

It is noteworthy in regard to sanitary science that though in regard to many things evolution and development may be traced through more than two hundred generations, effects of sanitary progress cannot be observed for more than a dozen; whilst for not more than three or four generations can it be said to have proceeded under systematic direction. Yet during that short period the benefits and improvements effected, represent one of the most gratifying—ay, startling—of historical facts.

The rapid strides made by sanitary science—all within a comparatively few years—may be interestingly impressed by the reproduction of a passage, written so recently as 1849, by the first to put forward a complete and concrete scheme for what one may well refer to as a Garden City, a scheme the minuteness of detail of which, both as to organization and realization, was truly surprising. Concerning health, the accomplished, well-read, and much-travelled author* remarks: 'In England, accounted by its inhabitants the most civilized and perfect country on the globe, it is now admitted on all hands by the sanitary reports of the public Commissioners specially appointed to examine the subject, and reiterated by the public journals of every shade of party politics, that there is no single

* James Silk Buckingham.

town in the whole kingdom that is adequately drained, or in which the dwellings are properly ventilated, in consequence of which premature deaths at all ages daily take place, and the very race itself becomes stunted and degenerated from imperfect growth and development, arising from architectural and municipal defects alone.'

It is, moreover, most interesting to observe how very closely, not only the views, but the remedial measures of this man of 'advanced ideas' coincide with the movement now occupying public attention. Such men are often spoken of as 'men before their time'; but is not this because the apathy and intellectual shortness of vision of the great mass impel them to attribute an aberration to Nature rather than to shortcomings in themselves? Having considered most exhaustively the state of matters existent at the time—now half a century past—the author of the revolutionary scheme to remedy the defects said: 'It is proposed that the public at large, the source of most of our social and moral improvements, shall take the matter into their own hands, and see whether, by proper care and due guarantees for security, a company can be formed, to be called "The Model Town Association," for the purpose of building an entirely new town, to combine within itself every advantage of beauty, security, healthfulness, and convenience that the latest discoveries in architecture and science can confer upon it; and which should, at the same time,

be peopled by an adequate number of inhabitants, with such due proportions between the agricultural and manufacturing classes, and between the possessors of capital, skill, and labour, as to produce, by the new combinations and discipline under which its codes of rules and regulations might place the whole body, the highest degree of abundance in every necessary of life, and many luxuries, united with the lightest amount of labour and care and the highest degree of health, contentment, morality, and enjoyment yet seen in any existing community established on the principles by which society is now generally regulated.'

The town was to contain every improvement in its position, plan, drainage, ventilation, architecture, supply of water, light, and 'every other elegance and convenience' which the improved state of art and science would admit of being conferred on it, within the means of the available capital to be raised for that purpose.

This man of precognition and buoyant spirit, despite his threescore years and ten, and with the close of a busy life at hand, even foresaw that his model city of 'Victoria' might be but as a stepping-stone to things of greater national importance. He accordingly set out that 'provision be made for the gradual increase of population by the gradual promotion of the most worthy and most efficient members of each rank or class to a "Reserved Corps," by which other similar associations on different

scales—from 2,000 to 5,000* individuals—might be formed and fostered and assisted as home colonies by the parent town from whence they sprung—as Tyre was settled by the surplus inhabitants of Sidon, of whom she was called "the daughter"; as Carthage was settled by the surplus inhabitants of botn of these parent cities; as Asia Minor was filled with Greek cities, and the coasts of Libya with Roman colonies, from the growing population of the parent States; and as England is now filling up her distant possessions—though room enough remains at home for millions more—by the more perfect organization and union of labour, capital, and talent which such model towns as these would furnish, and by which, in less than a century, all the least-peopled parts of England, Scotland, Ireland, and Wales might be progressively covered, absorbing the labour of every unemployed man, woman, and child in the kingdom, and rewarding them by a handsome remuneration.'

Judging from thirty years of experience and from observations derived from sanitary and statistical work, Dr. Richardson inferred that in his model City certain forms of disease would find no possible home, or, at the worst, a home so transient as not to affect the mortality in any serious degree—that infantile diseases, infantile and remittent fevers, convulsions, diarrhœa, croup, marasmus, and dysentery,

* His 'Victoria' in size was to be about 'a mile square, the number of its inhabitants not to exceed 10,000.'

would be almost unknown. There are, of course, many other diseases not directly attributable to want of proper sanitary precaution which must be left to time and to the modern Æsculapius to eradicate by patient study and the persistent wringing of the secrets and the requisite antidotes from Nature and from the recesses of the now vast storehouse of knowledge.

All this augurs well for the project in hand. A commencement is to be made upon a hygienically advantageous spot;* the scheme suggested is eminently healthful, and it must be remembered that just as all civilizing influences have tended to stamp out disease, so does all increase in civic refinement mark ground gained in sanitary progress.

'What are the most ready and convincing methods of making known to the uninformed the facts that many of the conditions requisite for health are under our own control; that neither mental serenity nor mental development can exist with an unhealthy animal organization; that poverty is the shadow of

* The principal towns in the neighbourhood of the site are Baldock (adjoining), houses, 504; population, 2,028; Hitching (2½ miles), houses, 2,198; population, 10,252; Bedford (15 miles), houses, 7,341; population, 35,144; and Cambridge (22 miles), houses, 8,701; population, 38,393; and these have the following death-rates (for the year 1902): Baldock, 18·2; Hitchin, 12·4; (Rural) 12·5; Bedford, 10·4; Cambridge, 14·4. (The death-rate for England and Wales for the same period is given as 16·3, which is the lowest rate on record.) The soil is good, and lies upon a substratum of chalk.

disease and wealth the shadow of health?' asks the physician. To this, surely, a not unreasonable reply would be: 'By the building of a Garden City wherein all the dictates of sanitary science shall be not only embodied in its inception, but adhered to in its maintenance.' This, I am persuaded, would not only bring home the *desiderata* 'to the uninformed,' but would provide the long-looked-for and much-to-be-desired model to the tens of thousands who not only desire to see, but to act upon its demonstrated principles.

What Richardson asked for, a Garden City can give! A community so circumstanced and so maintained by the exercise of its own freewill, guided by scientific knowledge, that in it the perfection of sanitary results will be approached, if not actually realized, in the coexistence of the lowest possible general mortality with the highest possible individual longevity; a working community in which death shall be kept as nearly as possible in its proper place in the scheme of life.

Therefore, there should be no doubt upon this point in regard to the City about to be brought into being. The common-sense and intelligence of prospective inhabitants, coupled with apposite regulations on the part of the authorities, should insure provision of healthy homes. Whether the sanitary condition of the streets will receive the attention he insisted they should receive—whether the dust-cart and the mud-cart shall be banished from them, and

tramways prohibited from their surface, all of which he recommended,* remains entirely to be decided by the degree of forethought, prescience, and enterprise to be evinced by the directors.

Having now, from considerations of health, of the common weal, of happiness, and, as some writers would have us add, from those of national benefit and security, shown that 'the return to the land' is highly advisable—nay, now imperative—let us consider if it be practicable, if industrial-rurality can be effected, and if, in that case, the benefits to accrue to some are to be attained at the cost of loss and detriment to others.

'If land be required for such schemes of social improvement,' the red-hot Socialists would say, 'go and take what is wanted, for it is ours! It belongs to us—the people!—not to those who now claim it. Take it! nor halt to consider compensation to those we may dispossess!' Then they will quote, 'Given a race of beings having like claims to pursue the objects of their desires—given a world adapted to the gratification of those desires—a world into which such beings are similarly born, and it un-

* It is interesting to note that Sir Benjamin foreshadowed some system of scavengering from *below* the road surface—a matter in which I have herein ventured to put forward a means of solution—although he does not describe any practical means of realization. Moreover, whilst prohibiting tramways on the surface, he says these should be run in subways, thus presaging a system to be introduced in the street improvements now taking place in London.

avoidably follows that they have equal rights to the use of this world. For if each of them "has freedom to do all that he wills, provided he infringes not the equal freedom of any other," then each of them is free to use the earth for the satisfaction of his wants, provided he allows all others the same liberty. And conversely, it is manifest that no one, or part of them, may use the earth in such a way as to prevent the rest from similarly using it; seeing that to do this is to assume greater freedom than the rest, and consequently to break the law.'

These are potent words, put forward, as they were, in the form of an axiom whereon to found a pleasant fabric of skilful and entertaining reasoning —potent words,* prepollent also for much harm, if misquoted and misapplied. They *have* been misquoted, garbled, split up, and misapplied by those whose ends they seemed likely to serve. Nay, more: they, with the fabric, the deductions, and the corollaries, have *continued* to be quoted as being the views and opinions of a pensive and astute philosopher *even after* they have been, half a century later, recalled and repudiated as representative of his more matured views and opinions.

In recalling opinions which erstwhile had made a great stir and called attention to his ability, the philosopher exhibited courage and integrity of purpose arousing in us admiration surpassing that we may have entertained for his previous reasoning

* Those of Herbert Spencer.

and the passages themselves. To mention this is but an act of justice to an eminent albeit brow-beaten writer, whilst to analyze his prior propositions is to corroborate our view of the opinions he held later.

Equity, he held, 'does not permit property in land, for if *one* portion of the earth's surface may justly become the possession of an individual, and may be held by him for his sole use and benefit, as a thing to which he has an exclusive right, then *other* portions of the earth's surface may be so held; and eventually the *whole* of the earth's surface may be so held, and our planet may thus lapse altogether into private hands. Observe now the dilemma to which this leads. Supposing the entire habitable globe to be so enclosed, it follows that if landowners have a valid right to its surface, all who are not landowners have no right at all to its surface. Hence such can exist on the earth by sufferance only. They are all trespassers. Save by the permission of the lords of the soil, they can have no room for the soles of their feet. Nay, should the others think fit to deny them a resting-place, these landless men might equitably be expelled from the earth altogether. If, then, the assumption that land can be held as property involves that the whole globe may become the private domain of a part of its inhabitants, and if, by consequence, the rest of its inhabitants can then exercise their faculties—can then exist even—only by consent of the landowners.

it is manifest that an exclusive possession of the soil necessitates an infringement of the law of equal freedom. For men who cannot "live and move and have their being" without the leave of others cannot be equally free with those others.'

In this there is much that is logically accurate, but attention should be directed to three points: Firstly, that the disabilities under which he foreshadows 'all who are not landowners' will suffer, does not properly apply in our age, for we are many thousands of years from that epoch when 'they can have no room for the soles of their feet'; nor need they be trespassers—beyond the truism that we are all trespassers upon the demesne of Nature—whilst vast tracts of unappropriated land yet remain, vast tracts that have not yet 'lapsed into private hands.' Secondly, that he assumes the prehistoric appropriations to have been *wrong*. Thirdly, he appears formerly to have assumed that the exclusive right of user implied proprietorship.

As to the first, a long period yet remains during which to adjust any aberration that may arise to the prejudice of the community as a whole. As to the second, we submit that the prehistoric appropriations were *right* and *valid*, for that they conformed to the law then existing—namely, Natural law. Whilst as to the third, we shall show this view to be erroneous by reason of the fact that our laws of to-day contain nothing that can be taken as implying or conferring proprietorship of the soil upon those possessing

exclusive right of user of it. Nay, more! that the land belongs to the nation—as typified by the Crown—and thus needs not the much discussed and impracticable *nationalization*. Moreover, that it *is* held for universal and public benefit, inasmuch as our Legislature is invested with full power to transfer it, as and when required, to public use.

I have pointed out that from the commencement all the operations of our world were carried on under the sway of rigidly enforced laws—the laws of Nature. At first these laws operated most conspicuously in regard to the control of elementally performed functions, the control and restraint of inanimate workers—were they terrestrial, hydraulic, aerial, or illuminative—just as to-day our water-supplies, our lighting, and such-like, are amenable to and are controlled by man-made contemporary law. Concurrently, however, the only existing law controlled organic evolution, but in a manner less discernible, until animate organisms had so far advanced as to render it apposite, that the appellation 'human' should be accorded to them. Then the universal law—the law of Nature—showed itself as potently and as authoritatively controlling the operations of mankind as of the inanimate workmen—the sun, the winds, and the waters we have referred to—busily engaged beside them in sculpturing the face of our world.

Now, the man who would deny that what Nature ordained and carried out was *wrong* would indeed

be a bold man and an ignorant. For the sake of simplicity I am leaving out of the reasoning any assumption of the operation of Dietial command or ordination. Now, Nature ruled that appropriation of the land *should* take place, at first by animals—both separately and collectively—and, later, by the more advanced animal, 'man,' both individually and in communities. Hence I submit the appropriation of the land and the defence of such holdings was *right*, and the title to continuance of such possessions *valid*. Then came into visibility a law, undoubted by no one, and continuing to our day, 'the law of the survival of the fittest.' Then came into operation 'the law of might.' *Might* was then *right*, alike with the human inhabitants as it was, and continues to be, in the animal kingdom. For at that epoch the suffusing and subduing influence of ethics had not commenced to gently roll back the mists of obscurity and chaos hanging over the limitless forests and the aboriginal dwellings of mankind. Thus, primitive men, I contend, became landlords by *right and in accordance with then existing law*—I will not say land proprietors, for they held their possessions at a price, that price being the cost of defence—precisely, indeed, as Nations hold *their* lands to-day.

By this are sapped the foundations upon which the philosopher builds up the *raison d'être* for his interrogatives. 'How long does it take for what was originally wrong to grow into right?' Con-

versely to this I would ask, 'How long does it take for what was originally *right* to grow into a wrong?' 'At what rate per annum,' he asks, 'do invalid claims become valid?' At what rate of amortization and conversion, I ask, do claims—validly contested for, begotten and held—become invalid, null and void? If a title gets perfect in a thousand years, we are asked, how much more than perfect will it be in two thousand years? Surely it is equally pertinent to demand, If a title be held as secure for a thousand years, why in two thousand years should it become shaky and insecure?

Time rolled on, and natural law became supplemented by man-made law—the law of order, which is that of established usage; the law of ethics, namely, the rules of human duties and the obligations of man to man; moral* law, which is common-sense applied to the common course of events—the ordinary judgment of mankind; prescriptive law, which contains little of common-sense. Then followed laws too numerous to mention, and, lastly, equity law—the giving to each his due according to the sense of natural right, as distinguished from legal right—this latter being the law the misquoting Socialist would have us so inequitably and so unconscionably violate in his favour.

* By morality is not here meant the will of God as a supreme moral ruler, but the doctrine or practice—for the time being obtaining—concerning the character and conduct of all responsible beings.

All these laws having been evolved from evolutionarily-bred needs many centuries subsequently to the appropriations complained of, by what manner of logical reasoning, by what vestige of equity, can we possibly, to-day, seek to assimilate the moral of operations carried out thousands of years before our time with the moral codes we have ourselves formulated, and continue to formulate, for the current conduct of ourselves?

Time is a great legalizer, and our legal dictates prescribe that immemorial possession must be taken to constitute a legitimate claim that that which has been held from age to age as private property, and has been bought and sold as such, must now be considered as irrevocably belonging to individuals. To this proposition, the philosopher to whom we have referred, averred he would give willing assent when propounders should have assigned it a definite meaning. To do this, he urged, they would have to find satisfactory answers to such questions as, 'How long does it take for what was originally a *wrong* to grow into a *right*?'

Now, the original wrong, we submit from the above reasoning, never existed, and hence the difficult metempsychosis has not to be performed, and this brings us to the third and last point to which we will endeavour to 'assign a definite meaning,' and at the same time demonstrate the Socialistic denouncement of the land being held by individuals in such a manner, they aver, as to be to their

detriment—to be a delusion; that, indeed, landlords possess but the right of user of their terrestrial possessions, which, in fact, are held by the King in trust, as it were, for the good of the people, to be transferred to them at such season as it shall seem good for the community at large.

To substantiate the above view, one or two quotations from eminent jurists will suffice. Take Sir F. Pollock, who said: 'It is commonly supposed that land belongs to its owner in the same sense as money or a watch; this is not the theory of English law since the Norman Conquest, nor has it been so in its full significance at any time. *No absolute* ownership of land is recognised by our law-books, except the Crown. All our lands are supposed to be held immediately or mediately of the Crown, though no rent or service may be payable, and no grant from the Crown on record.' Whilst Sir W. Blackstone said: 'Accurately and strictly speaking, there is no foundation in Nature or in natural law why a set of words on parchment should convey the dominion of land. Allodial (*i.e.*, absolute) property no subject in England now has, it being a received and now undeniable principle in law that all lands in England are holden mediately or immediately of the King.' 'All lands,' said Justice Stephen, 'owned by subjects in England are in the nature of fees, whether derived to them by descent from their ancestors or purchased for a valuable consideration; for they cannot come to any man by either of these

ways, unless accompanied by those feudal incidents which attended upon the first feudatories to whom the lands were originally granted.' 'All landowners are merely tenants in the eye of the law.'*

Those of the down-with-everything sect are principally of that class, arrogating to themselves the purity of the lily—for they toil not, neither do they spin—and hence are without the fabric of intrinsic worth wherewith they could barter for the coveted possessions. Hence they cry '*Give*'—the word is advisedly written—'*Give* us the land,' compensation apart.

The reader will be but doing justice to social reformers of integrity if he will observe and remember that none of those of high principles and of moderate and thoughtful temperament have ever contemplated the *giving* of the land to 'the people'—whatever that wide generic term may mean in this relation—without fair and proper compensation to the present occupiers, how extreme soever their views may have been regarding the right of 'the people' to demand it as their own.

Others—of more moderate views than the claimants for gift and equality—put forward the preposterous proposition that compensation should be paid, but not upon the basis of to-day's valuation. *Their* contention is that, in the first place, it was obtained by theft; secondly, that land which has been worked and improved by its owners has

* 'Real Property' (Williams).

been '*alienated from the nation*'; and, lastly—most preposterous of all—that the value of the land being only in part due to the exertions of the *final* owner, no matter what sum he may have given for it, he should only receive some *smaller* sum, as, for example, the amount paid by his *ancestors*.*

With regard to its having been obtained by theft, the appropriation of land, when there was room for everybody in every country, cannot be looked upon as theft, except as it might be from Nature, who would as freely give it as she would light and air. The appropriation of land which *had* been appropriated *would* be theft—firstly, because the prior squatter would be robbed of his means of subsistence; secondly, because the fruits of his toil—unlike the land—would be real, personal, and exchangeable property. 'Bodies of men, land, water, and air, are the principal of those things which are not, and which it is criminal to consider as personal or exchangeable property,' says Ruskin. To this all assent, but it must be remembered that the *outcome* of man's labour upon the land, with the co-operation of air and water, undoubtedly constitutes real estate, the appropriation of which, in prehistoric days, would have been theft as much as

* If this were not *theft*, then there must be a contradiction in terms. Moreover, it is obvious a landowner must never get richer. To draw a parallel in international ethics, it would be equivalent to a nation being periodically called upon to divide the increment of its wealth amongst other nations.

with us to-day. The ethics of the time, however, took no count of the immorality of theft. Might was right, and the usurper of the prerogatives of the hairy man's capital would, I fear, have quickly succumbed to capital punishment.

It would be of intense interest to have these ruthless reformers explain how *they* would have acted had *they* lived in centuries past. Judging by their loud-voiced proclaimings of to-day, they would have *divided equally*. But divided what? And between whom? The known and explored surface of our world was in those days, as in ours, a variable quantity, constantly increasing; the population of those times, as in ours, was also a variable quantity, constantly increasing; obviously, therefore, the equitable division of land of one day would, in their eyes, have been unfair and immoral the following day.

The effect of the equal division of the land of our country to-day is easily answered; it would be *starvation* for all! For if this wild reform were carried into effect, we should have had in Great Britain in 1895 33,000,000 acres of land under cultivation, to be divided among upwards of 36,000,000 people, with the result that for every *hundred persons* there would be *ninety-one acres* of land—just a little over $\frac{9}{10}$ths of an acre for each person.

It is computed, as a general rule, that it requires at least two acres of cultivated land to support each

inhabitant, so we see that an equal division of the land would result in every man obtaining enough to support himself on *for five and a half months* out of the year. As for the other six and a half months, he would have the alternative of starving. In the eight years that have elapsed since the above figures were collected the population has increased to over 40,000,000, whereas the amount of land capable of cultivation is a fixed quantity, so that an equal division would be even more disastrous to-day than at the date I have taken for my exposition of this absurd fallacy.

This calculation reminds us of the amount of truth contained in the reply of Dobson* when asked for his opinion of the assertion that 'the land belongs to the people': 'Well,' I says, 's'pose my pig's the land, and you says it belongs to the parish, and there be a thousand i' the parish, taakin' in the women and childers, and s'pose I kills my pig and gi'es it among 'em, why, there wudn't be a dinner for nawbody, and I should ha' lost the pig.'

Equally puerile is the suggestion, so often made, that the wealth of the land should be equally divided. Not only would it prove far from the *panacea* for universal woe, but it would prove the most *transitory* of any reform ever suggested. Half a decade, I am convinced, would suffice to present an *in*equality of land-proprietorship rivalling that of to-day. Half a decade would be more than

* 'The Promise of May,' Tennyson.

ample for the drunkard to 'drink through' *his* acres. Far less would suffice the spendthrift to 'run through' *his*, whilst a few hours would be ample for the gambler to 'stake away' *his*. Such suggestions are made entirely without consideration —an absolutely necessary consideration—of the frailties of human nature. To form an opinion upon this point, let us consider the simple, hebdomadally recurring operation of the payment of men in a large works. There we have the case of an approximately equal division, for each man receives about the same as his companions. Therefore on Saturday afternoon they stand upon that equality of footing, the *ne plus ultra* of the socialistic eye. But what of the very same evening? Let us visit in spirit the dwellings of a couple of the participants of this much-vaunted *égalité*. What will their trumpet-blast—*liberté* and *fraternité*—avail some of them? In the small hours the one will roll up to his dirty, ill-furnished attic with a few shillings—residue of *his* division of the outcome of a week's labour—to be surreptitiously extracted from his pocket by the trembling wife. Had we, on the other hand, called even in the afternoon at the trim and cosy, well-furnished cottage of the sober and conscientious worker, we should have seen him, who on his way home had paid a visit to the 'penny bank' and the building society, smoking the pipe of contentment in the absence of his wife during her 'shopping,' in whose sparingly-opened

purse would be found the bulk of his earnings. The one is working his way towards the acquisition of his own little freehold—as Robert Burns would say :

> 'Not for a train attendant,
> But for the glorious privilege
> Of being independent,'—

which, his lazier *confrères* claim, should be divided amongst *them*—the other is finding his way to the workhouse. But quite the same argument in regard to division holds good in middle-class life and above it.

It is useless to dwell upon such facts more than to call attention to the puerility of such proposals.

In elaborating these sweeping and far-reaching schemes of drastic reform, the schemers—or dreamers—overlook the most obvious facts. They plot to possess those things, the possession of which by others they decry as immoral. They appear to entirely forget that material wealth is transitory and everchanging. 'Wealth forms,' as the social economist terms it, are, like our human bodies, subject to constant transmutation; experiencing incessant decay; necessitating constant rebuilding. To acquire such—by the proper developmental machinery—there is no need to confiscate that, for the time being, in the possession of others. In the following pages I shall touch upon instances of men, *entirely without capital*, co-operating in industry to mutual advantage, and thereby rapidly acquiring

both material and monetary wealth. If one-hundredth part of the energy displayed by agitators —who prove to demonstration that 'money is the root of all evil,' and straightway endeavour, by the laziest means, to secure a branch of the corrupt tree—were directed to the acquisition of a competency through rational ways always open to them by means of industry, they would not only benefit themselves, but be enhancing the 'welfare of the nation' of which they preach in such grandiose style.

Far too much of hypocrisy is contained in the oft-reiterated reference to *multitudes eager to work.* Manufacturers can tell another story. It is, for example, within my personal knowledge that men in *constant employment* and earning high wages joined in the—largely bogus—processions of 'the unemployed' last winter. During their absence, work in their employers' factories, which were very busy at the time, was disorganized, yet these men were reinstated through dearth of others. Had they been discharged their first cry would have been a bitter wail concerning their wives and children, yet not one stopped to reflect that in filching the alms offered they were guilty of *theft*—they were *thieving* the bread out of the mouths of those genuinely distressed, for whom provision was being made.

And so it will continue so long as indiscriminate 'charity' (*sic*) continues, so long as the 'charitable'

are too lazy to investigate, so long as many arrogate to themselves the notion that in writing a 'charity' cheque they are squaring accounts with futurity. If Garden Cities did no other good, they would do *immense* good—by means of the restriction of the population in each—in affording opportunity of sifting human wheat from human chaff.

Work is better than bread; for the former brings the latter; but with it is a feeling of pleasurable satisfaction the 'bread of charity' can never give.

Let us not, however, become disheartened by the knowledge, so constantly brought home to us, that the human harvest-field is so plentifully bestrewn with tares, that the bread-produce of the worthy is so greatly leavened by the unworthy. Let us rather bear with this because of the inevitable truism, emphasized by John Stuart Mill, that 'the worth of a state in the long-run is the worth of the individuals composing it.' Remembering also—for this assuredly should not be forgotten—that our duty to our neighbour is not all that our conscience should compel us to observe. We—of the better informed—have a duty to perform, the results of which we cannot hope to see. It is of the greater importance, indeed, that we should strive to effect good to those whom we shall never know, yet to whom we may become known by our works; for then may we benefit a far greater number. To-day we can but influence the welfare of a few parents,

but to-morrow our influence may be propagated and vastly amplified through the instrumentality of their children and children's children.

Some, indeed, there be—it matters not how many to-morrows may come and go—who never die. Nay, some by their imprint speak more eloquently than ever they did with their lips. 'Let us eat and drink, for to-morrow we die,' the maxim of the ancients, should not apply with us. Let us apply our energy to the wheel of progress, storing up in it, while we may, beneficent momentum, to be returned in useful effect long after our own exit. Energy absorbed in putting into motion a Garden City, for example, is well calculated to return, by its beneficent momentum, manifold such initial work—rendered, it may be, for a time latent, potentiated, as it were—to be vastly drawn upon by futurity.

This is well put by Richardson in regard to health and happiness: 'To whatever extent we, by our exertions, confer benefits on those who live, we extend the advantage to those who have to live; that one good thought leading to practical, useful action from one man or woman may go to the virtue of thousands of generations; that one breath of health wafted by our breath may, in the aggregate of life saved by it, represent in its ultimate effect all the life that now is or has been.'

It is in the *attempt* we should find pleasure and recompense, not alone in the achievement. Of this the poet thus reminds us:

'If what shone afar so grand,
Turn to nothing in thy hand,
On again; the virtue lies
In the struggle, not the prize.'

Looked at from both the practical and the philanthropic points of view, then, such Cities are prepollent to perform immense good, especially if through their apposite organizations, their 'women's leagues,' and the like, they will bend their efforts towards the fostering of 'self-help.' If 'Help for self-help'* be their motto and invitation, the *right sort* of material will flow to them; and then, concurrently with self-support due to self-help, will they be able to extend help to the helpless.

Let us, then, one and all, apply our shoulders to the wheels of progress, to the good end that we may, in a few years, look back and say with Milton:

'Soon had his crew
Opened into the hill a spacious wound,
And digged out ribs of gold. . . .
Anon, out of the earth a fabric huge
Rose like an exhalation . . .
Built like a temple.'

* The expression is due to Sir Horace Plunkett.

Self-cleansing 'Invert' Roadway (Sennett)—appearance Piccadilly would present if constructed upon the Author's Plan.

CHAPTER II

ON THE LAYING-OUT OF GARDEN CITIES

'The honest projector is he who, having by fair and plain principles of sense, honesty, and ingenuity, brought any contrivance to a suitable perfection, makes out what he pretends to, picks nobody's pockets, puts his project in execution, and contents himself with the real produce as the profit of his invention.'—DE FOE.

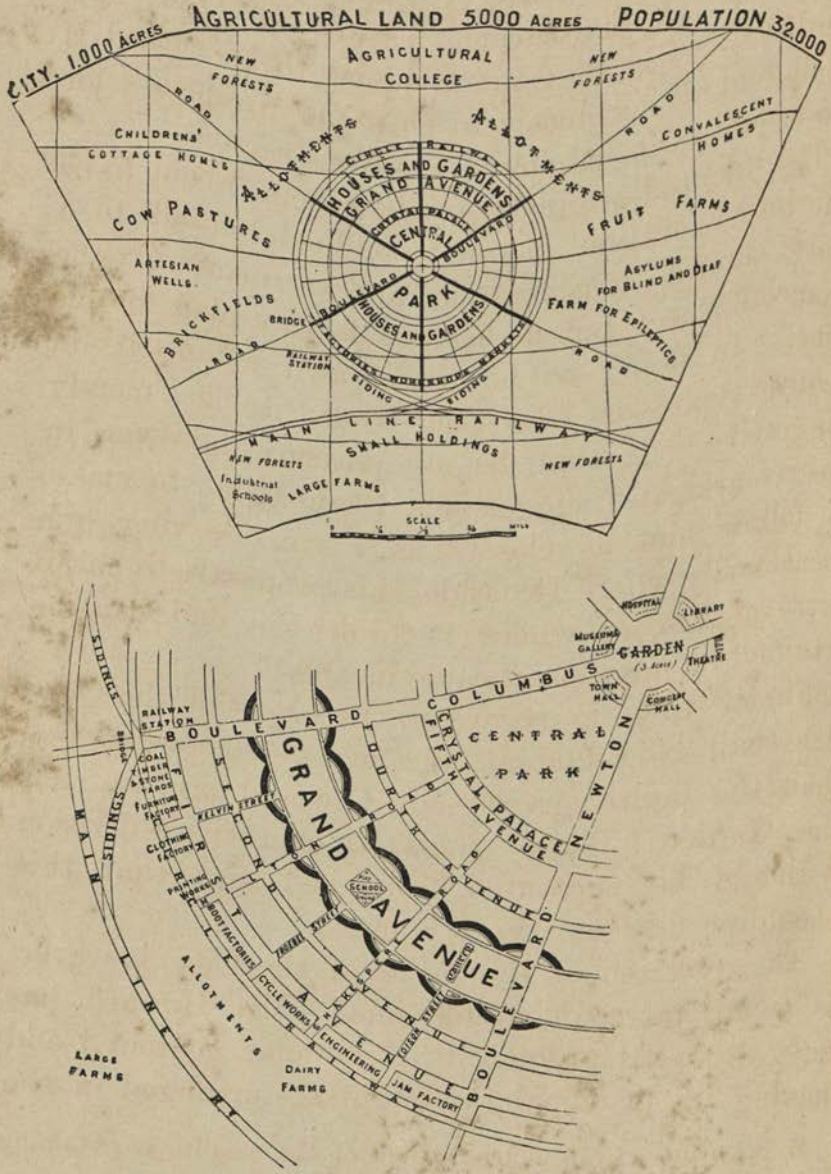
IT has certainly come as a pleasant surprise that, at this date and within the narrow confines of 'our little island,' engineers and architects should have—laid out, as it were, upon their work-bench before them—a tract of land, *terra natura* almost, of no mean proportions—a district, in fact, whereon a City is to be reared, and to have the opportunity of cerebral exercise in connection with it.

Having regard to the *status* now held by both professions, the question is not so much 'How will they carry out the work?' as 'How will they be *allowed* to carry out the work?' The occasion is so refreshing and novel, and such a reversal, that it reminds one of the man who presented his wife with

a button and requested her to look 'slippy' and fit a shirt to it. The land is the button, and the shirt is to be fitted to it in the form of the broadcloth of experience, designed and 'cut' to the very latest fashion by the light of modern innovation. That, at least, is what one hopes! But will it be so?

'He alone discovers who *proves*,' runs the maxim. Buckingham and Howard claim to have discovered the solution of a great problem! Let engineers and architects amicably, with energy and integrity of purpose, help them to *prove* it. That a bold attempt is to be made to consummate their ideals is certainly a source of satisfaction. It should be our anxiety that all that patient thought, unswerving endeavour, and bold attempt can do should be done towards the realization of the hoped-for success; but, above all things, let patient thought *precede* the work of installation—it were futile to *think* afterwards.

But what boots the thought if it be not carried into effect? If the dictates of science are to be eternally cast to the winds? If the thought of what *has been* is for ever to overrule the thought of what *might be?* If the planet of economy is to rise paramount, and the satellites of invention, innovation, and improvement, always, unhappily, constrained to move in their orbs around it, are *always* to gravitate towards it and be destroyed? Surely this is a case for compromise. There should be a harmonious blending of prudence in economy with



Plan of City proposed by Ebenezer Howard, showing a 'Ward' (or Sixth Part) to Larger Scale.

boldness of expenditure. Cheapness is often very expensive. A reassuring feature of 'the first Garden City' is that the dividend to be earned is small, and all surplus is to go to improvements for the benefit of its inhabitants. *Nous verrons.*

The talented originator of the scheme about to be put into operation has not confined himself to a most careful consideration and scrutiny of the financial aspect, but he has put forth a plan for his City. In doing so he has drawn attention—in heavy type — to the fact that it is 'merely suggestive.' It shall be my pleasure, however, in the remarks and suggestions I am about to make, to follow him as closely as I can, leaving him occasionally where I consider his proposals to entail extravagance, or where I think the end can be attained by more practicable means.

Firstly, then, in regard to the *extent* of the City, this shall be taken at 822 acres—somewhat less than the figure given—but I would propose that the 'Garden Village'—*i.e.*, the operative's division —should be separated from it,* and that this should occupy another 478 acres.

The question of the *shape* of the City, however, is a far more debatable one. Mr. Howard has suggested a Garden City of circular contour,† and having its principal thoroughfares arranged in the

* Principally from considerations of the conditions obtaining upon the actual site of the 'First City.'

† See diagrams.

form of concentric circles, but he has not, so far as I am aware, explained the advantages, if any, his circular system would possess over a rectangular plan. In order that it might not be thought I desired to disparage the plan, or to hinder the realization of an entirely novel innovation concerning the laying-out of towns, it was my intention to draw up a balance-sheet consisting of *pros* and *cons;* but, looking at it from the point of view of an engineer, I find I have so little to place to its credit that I am unable to do this.

If one reflects that during a number of centuries very numerous opportunities have arisen, in the laying-out of cities, to carry such a plan into effect, and that we find nothing of the kind has ever been done, I am inclined to think that engineers and architects generally have been of my way of thinking. It is clear, moreover, that not only has the trend, during the last couple of centuries, been towards a more and more rigidly rectangular plan, but that the ancient Roman engineers, many of whose works stand to our day the admiration of the world, and who, be it remembered, were entirely unhampered, chose rectilinear *vias* and rectangular conformation. Nothing, in their opinion, was more imposing than broad and straight roads in combination with noble squares. It is only right to mention, however, that such was in accord with the rigidly symmetrical architecture of the period. We have only to instance the rectangular conformation

Plan of Modern Athens.

of Rome itself, of Pompeii, of Herculaneum, and other ancient cities.

Turning to the ancient Greeks, the boldness and symmetry of whose classic architecture, its purity and perfect proportionment, stand to-day the wonderment and admiration of us all—the spirit of emulation of our architectural students—we are taught the same lesson. Indeed, in studying this matter of 'laying-out,' I have come upon a most interesting and instructive exemplification, not only of the high value they set upon regular and rectilinear design, but of the curvilinear design of one of their greatest and most artistic cities being subsequently discarded in favour of the rectilinear. I refer to ancient Athens. The Oracle, we are told,* in reply to its supplicating inhabitants, made use of the expression *πόλις τροχοειδέος ἄκρα κάρηνα*, in admonishing them to flee from 'the summit of their *wheel-shaped* city.' Verily, 'there is nothing new under the sun,' for this city must have had its inception *many centuries* B.C. It is further interesting to observe that research and exploration tend strongly to confirm this.†

Let us now, by the aid of the map, glance at the effect evolution has had upon 'the wheel-shaped' city; there we see that almost all trace of the circular has given place to the rectilinear. Modern Athens is particularly interesting to us in this relation, also,

* Herodotus.

† For much interesting and valuable information I am indebted to Professor E. A. Gardner.

because it affords an unusual and interesting combination of the rectangular plan in conjunction with the radial. We see that placed upon the centre line and somewhat to the north is a spacious square —the square of Concord; running through this square is the main street of the city—Athena Street, whilst it is also traversed laterally by a broad thoroughfare running east and west. In addition to these, however, there are radial streets bifurcating from the central square at angles of 45 degrees, all the thoroughfares lying to the east and west of these radials being, it will be observed, laid out parallel to them and with near approach to rigid regularity. Northwards, again, we see them parallel to and at right angles to the central longitudinal highway.

Consideration of the Piræus, also, is equally interesting, not only by reason of its rectangular regularity, but also of the additional evidence it affords of the curvilinear being discarded in favour of the straight-lined conformation. The Piræus was laid out after the designs of Hippodamus of Miletus, who also laid out the city of Rhodes, which, according to Strabo, resembled the Piræus in character. Both consisted of a system of broad, straight streets, crossing one another at right angles, with spacious squares, devoted to religious and civil use, one of these—the Agora of Hippodamus—being situated in a central position. Rhodes, which stood on the slopes of a natural amphitheatre, was one of the most splendid cities of the world, adorned as it was

The Ancient Piræus.

The Modern Piræus.

with magnificent buildings and exquisite works of art. Its Colossus—the statue of Helios—was one of 'the seven wonders of the world,' and had as its companions a hundred others, all colossal, whilst no less than 3,000 others of smaller stature were there to adorn the grand city. Of this ancient splendour, unfortunately, nothing remains, the more modern town—built by the Knights of St. John—having its streets narrow and winding, though the houses are solidly built, doubtless from the stones of ancestorial grandeur. The laying-out of the Piræus belongs to the *fifth century* B.C.

Hippodamus evidently understood his profession, yet, although he had 'the wheel-shaped city' to guide him, he chose to lay out his masterpieces upon the rectangular plan. A map of the ancient city of Piræus is given, and there will be seen the extraordinary regularity of its plan. From the central square a road led direct to Athens, whilst another broad, straight highway led to the temple of Artemis Munychia, situated upon the shore of the harbour, standing upon the same quay and close by being other public and civic buildings, including the Digma—the Exchange, where merchants could congregate, show one another samples of their goods, and transact their business, with the help of the bankers, who kept their stalls in the same building.

It is very interesting, moreover, to observe how very closely the plan of the ancient Piræus has been adhered to in the more modern city. If we carefully

examine the two, by means of the plans given of each, we shall see that the present is but an amplification of its progenitor of more than two thousand years antecedent.

Coming to modern times, we might take, as another and typical example, a city justly celebrated for the boldness of its conception, and one, by reason of the vastness of its open spaces, approaching most nearly to a 'Garden City'—I refer to Washington, the capital of the United States. Here, again, we find the rectangular—I might almost say cellular—form in combination with the radial, the latter being more fully developed than is the case in Athens; for whereas in the former city we find radiating from the centrally placed square of 'Concord' two or three *radii*, we see in Washington radiating from the 'Capitol'—as a place of central interest—six radial avenues perfectly straight and of great length, extending, indeed, to the confines of the city diagonally, in addition to the eight streets forming the boundaries of the great square, which also completely traverse the entire city laterally and longitudinally. From the centre of the vast *square*, thus so efficiently served with thoroughfares, uprears the classic and majestic 'Capitol.' In addition to this centrally disposed space, the city is provided with numerous smaller ones; indeed, out of the 6,000 acres covered by the city (to be exact, 6,111), these spaces and parks absorb some 500 acres (actually 541), thus giving

REFERENCE TO FIGURES.
Hotels.
1 Arlington B 3.
2 Riggs' House D 6
3 Washington C 4
4 Willard's C 5
5 [illegible] C 4
6 [illegible] C 4
Prominent Buildings.
6 National C 4
7 Metropolitan C 4
8 Washington C 4
9 Willard's C 5
10 Wormley's B 5
11 St. Mark's C 4
12 St. James C 4
13 Capitol C 5
14 Patent Office C 4
15 U. S. Treasury C 5
16 Executive Offices D 6
17 State, War and Navy Departments C 5
18 Post Office C 4
19 Masonic Temple C 4
20 Corcoran Art Gallery B 5
21 Washington Monument C 5
22 Smithsonian Institute C 4
23 Stat. of Washington B 5
24 Statue of Gen. Scott B 3
25 Statue of Gen. Thomas C 4
26 Navy Yard E 6
27 Botanical Gardens C 4
28 U. S. Arsenal E 4
29 Soldiers' Home C 1
30 Army and Navy Hospital C 3
31 Columbian University C 4
32 Howard University A 4
33 Georgetown B 1
34 Observatory C 2
35 Naval Observatory C 1
36 Treasury Annex C 5
37 Patent Office C 4
38 General Post Office C 4
39 Smithsonian Institute C 4
40 Cath. of St. Aloysius B 5
41 St. Matthew's C 4
42 St. Augustine B 2
43 St. John's B 3
44 St. John's B 3
45 Ch. of the Epiphany C 3
Churches.
Theatres.
Depots.
Barracks.
Squares.
Charities (Continued.)
Bridges.
Cemeteries.
Scale of Yards
CITY OF WASHINGTON
POTOMAC RIVER
EASTERN BRANCH
ALEXANDRIA
GEORGETOWN
LEESBURG
LEESTOWN

Plan of the City of Washington, typical of the Rectangular in Combination with the Diagonal Configuration.

a proportion of *one-eleventh* of the total city area for parks.

The point, however, to which I desire to draw especial attention is the area of the streets—broad, straight avenues so spacious that they have in many instances been laid out with trees, grass, and flower-beds, so that they in themselves constitute additional parks. Out of the 6,111 acres of space covered, we find that 2,554 are occupied by streets and avenues, giving a proportion of nearly 50 *per cent.* of the total area as that of its streets (as 1 : 2·4). Put into other words, the foresight of the engineer has, in this beautiful yet utilitarian manner, preserved to the city for all time nearly one-half of its area free from danger of encroachment by buildings.

Yet this prescience, now lauded, did not escape severe criticism, taunt, and ridicule, 'the City of Magnificent Distances' being one of many gibes. Truly

> 'The man is thought a knave or fool,
> Or bigot, plotting crime,
> Who, for the advancement of his kind,
> Is wise before his time.
>
> 'Him shall the scorn and wrath of men
> Pursue with deadly aim;
> And malice, envy, spite, and lies,
> Shall desecrate his name.'*

The object of public ridicule in this instance was the celebrated French engineer L'Enfant (probably

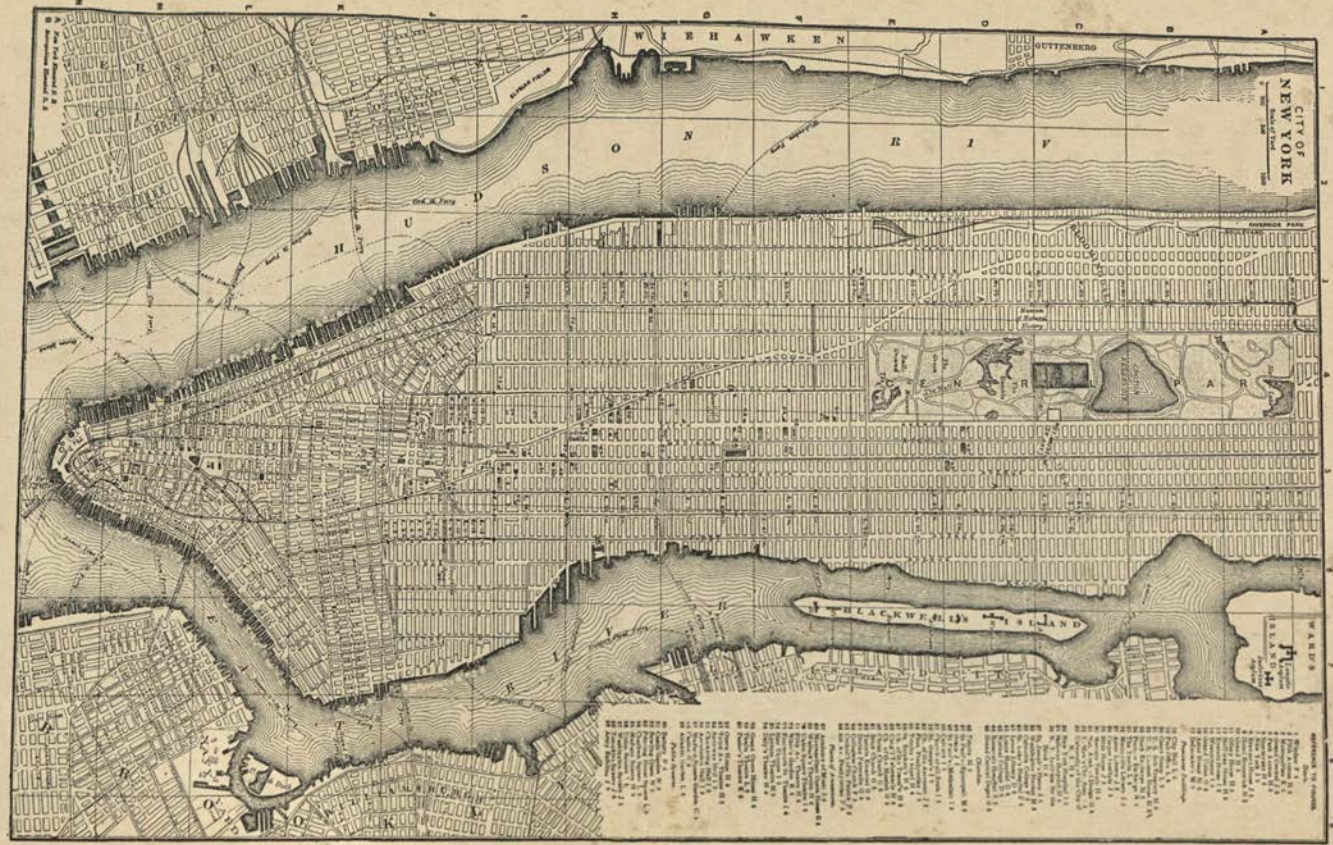
* Charles Mackay.

dubbed *L'Enfant terrible*).* To-day the spirit of ridicule has turned to that of admiration of the utility of the bold design to a population of some 350,000 people. L'Enfant is said to have based his design largely upon that of *Versailles*. Its characteristic, as I have endeavoured to show, is, whilst adhering rigidly to rectilinear treatment, the crossing of the rectangles by broad diagonal avenues. This arrangement has been described as 'a wheel laid upon a gridiron,' and later as 'the city of Philadelphia griddled across the city of Versailles.'†

The ground, which is gently undulating, a crest 90 feet above the average having been chosen as the site of the Capitol, measures 4½ miles by 2¼ miles broad. From this a mental picture may be drawn of the length and stateliness of the avenues, which vary from 120 feet to 160 feet in width, are all tree-clad, and connect numerous circular and triangular gardens and reservations, interspersed as little parks throughout the city. The streets and avenues thus laid out are asphalted, and afford fine vistas of handsome public buildings, monuments and verdant squares, with the Capitol and monument dominating the whole. The long diagonal avenues to which I have referred are named after the different States of the Union, whilst the streets running north and

* The laying-out has also been attributed to Andrew Ellicott.

† It will be seen from the plan herein reproduced that Sir Christopher Wren also proposed the employment of diagonal streets.



Plan of the City of New York, typical of Rectilinear and Cellular Configuration.

south are numbered—those running east and west are named by the letters of the alphabet. The circular spaces formed by the intersection of the streets and avenues form one of the most charming features of this fine city, some of the characteristics of which might with advantage be borne in mind in the laying-out of the First Garden City.

The effect of these radiating thoroughfares in Washington has been to produce a number of triangular open spaces, which, being laid out as gardens, add greatly to the beauty of the city. The value of the diagonal thoroughfares is principally utilitarian, for they materially shorten the distances from the centre to the corners. They are, however, open to one serious practical objection—that they necessitate a great number of buildings having an irregular, acutely angular, and hence difficult plan. In our day, when mechanical locomotion is resorted to to such a degree, it is probable they would not be repeated.

If we turn to another typically modern city—the regular and rectilinear aspect of which is truly surprising: I refer to New York—we shall find the diagonal highways are absent. As an example of a European city preserving the Roman plan, we might take Turin. But it may be said, in a word, that all modern cities of 'the New World,' as well as the principal cities and towns upon the Continent, are strictly rectangular. What is most interesting, also, we find that Continental architects, in carrying

out the now prevalent system of beautifying existing towns by placing a *Ringstrasse*—a 'ring' or 'loop'—around them, generally on three sides, make the 'ring'—consisting of a broad avenue with gardens at the centre—*rectangular*. Their object, doubtless, is to obtain noble *vistas*, the like of which—as I show later—curvilinear avenues can never present. As an interesting exemplification of this it may be mentioned that the celebrated 'ring street' (*Ringstrasse*) recently finished—a complete and noble *ceinture*—around the entire city of Vienna, instead of being *circular*, as it might well have been, is in the form of an irregular pentagon composed of five *straight* and stately avenues of approximately equal length.

Such great and lengthy *Strassen* impart great dignity to Continental cities, such as none of our own possess. What would ancient Munich be without its long and lordly *Ludwigstrasse*, of immense width, flanked for its whole long length with colossal palaces, now principally public buildings? The variety of architecture we can there take in at one *coup d'œil* is inspiring and elevating, and must be seen to be appreciated. We enter it by passing under the classical *Siegesthor*, reminding us of the triumphal gates of Rome; as we proceed along it we might be in an enlarged *via* of Turin. Its façades are Italian: its one end is spanned by a gate correctly Roman, the other is blocked by the *Feldherrenhalle*, which might be a corner of the

Piazza della Signoria, in Florence. The *Residenz* is precisely what a Medici would have built. The *Theatinerkirche*, to our right, is distinctly Italian, whilst the lofty towers of the *Frauenkirche*, rearing up behind, are Persian of aspect. Again, just behind, on our left, the Opera-House and its *platz* looks so modern and familiar that it might have just dropped in from Brussels; whilst a few steps further we are in a medieval market-place, the *Marienplatz*, with its old Rathaus. Not one-fiftieth part of this could our eyes have taken in had the architects to those ever-to-be-lauded patrons of art, the Emperors Ludwig and Maximilian, laid out these glorious *Strassen* in curvilinear form. The *Ludwigstrasse* is almost equalled in grandeur by the *Maximilianstrasse*.

What a degree of dignity would modern Rome be shorn of were the lengthy *vias non est*, which enable us to see, through straight and undulating thoroughfares, from one to another of the 'seven eternal hills'! What immense dignity would Paris of to-day lack had that far-seeing engineer, Hausmann, omitted to include in his plans that gloriously straight tree-bordered, multiple *boulevard* connecting the Gardens of the *Tuileries* with the colossal *Arc de Triomphe*, so designed that the Emperor might look from the windows of his palace, through the length of his orange-tree bordered gardens, across the beautiful *Place de la Concorde* up the gently-rising avenue of the *Champs Élysées*—probably the finest avenue

in the world—to the Grand portal, which, had it not been of immense dimensions, could scarcely have been seen, so great is the distance.

Reflecting thus, I am constrained to think the designers of these cities were right in their prescience and in their bold conceptions of rectilinear conformation. True art, of course, demands that there should be harmonious blending of the rectilinear with the curvilinear, but I contend that the rectilinear should be found in the thoroughfares. No better example could be given than the architecture to which I have just referred. What could be more perfect than that the colossal and classical façade of the Madeleine, with its many-columned portico, should stand *vis-à-vis*, though at a great distance from, a similarly classic portico — the *Chambre des Députés?* Yet the grand and perfectly straight road connecting the one with the other merges imperceptibly into the beautiful curves of the *Concorde*, but to leave it by the rectilinear bridge giving to the escaliered plinth of the latter great edifice. Moreover, as it will be remembered, the broad and lengthy *Avenue des Champs Élysées* is at several points of its length broken by *rond points*, from which diverge, in regular and pleasing fanlike form, long, equally straight *rues*, their intersections being beautified by delicately spraying fountains.

Having drawn upon examples of New World and Continental cities, it will be interesting to refer to

the proposals of one of our most celebrated architects —Sir Christopher Wren—proposals most unhappily not carried into effect.

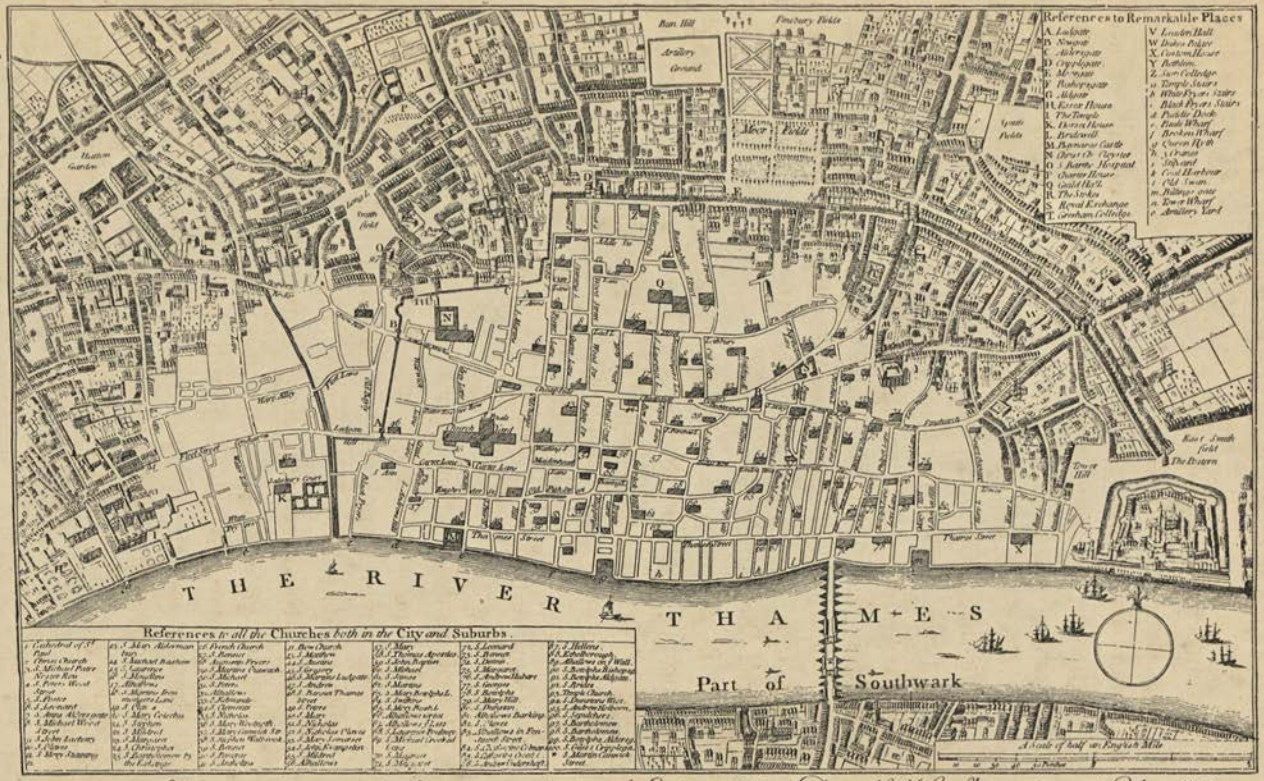
There probably never has been, and it is to be hoped never will be, a more lamentable example in connection with civic design of the evil effect bequeathed to succeeding generations of want of forethought and foresight upon the part of those that have gone before than that presented by the mode of rebuilding of the City of London — the more deplorable because the advice of the able adviser was absolutely ignored. I will therefore touch upon it for the reason that it is doubly interesting to us, because it not only teaches us what to avoid, but it also shows us what were the views held by a great master.

The unprofessional public are probably quite without that knowledge and experience which would serve to impress them with the enormous amount of work great and successful professional men are called upon to expend quite *uselessly*. James Watt, in replying to a nobleman who was expressing to him his admiration of the former's achievements, said: 'The public only look at my success, and not at the intermediate failures and *uncouth constructions* which have served me as so many steps to climb to the top of the ladder.' How well this applies to our celebrated artists and architects! As to engineers, it applies with still greater truth; their life is one long series of 'improvements,' their education

extends to the whole span of life. In this relation I was deeply impressed with a remark of George Robert Stephenson to the effect that one-half of an engineer's life was spent in undoing what he ought never to have done, this being in allusion to the fact that *all* primary mechanical combinations are invariably more complicated than they need be; it is only by the most patient study that simplification can be effected. The engineer's life—whose watch-word is 'simplicity'—is a continuous battle with complication. But these complications — these *uncouth constructions*—constitute the brain work which the public never sees.

It is therefore a satisfaction to be able to bring, in proper relation, before the reader an account of the proposals and scheme of rebuilding the City of London after the disastrous fire in 1666. In doing so I feel I cannot do better than to use the words of an eminent man of the time—Christopher Wren—who was the eldest son of his talented father, Sir Christopher, 'Surveyor-General of the Royal Buildings,' who had held that most honoured and most coveted position in science, the presidential chair of the Royal Society. The son, in a work of much literary merit, his 'Parentalia,' perpetuated the doings of a celebrated family.

In this relation I found my research into the changes which, during many centuries, have come over our grimy, yet beloved Metropolis, so interesting that I venture to think the result may also prove of



A PLAN of the CITY and LIBERTIES of LONDON; shewing the Extent of the Dreadful Conflagration in the Year 1666.

interest to my readers; but in case some may not care to follow them, I have delegated them to the pages of a booklet dealing with such evolution.* The laying out of London, seeing that it was happily—or unhappily—not entirely demolished, was beset with difficulties, not the least of these being the great haste with which it was necessary to draw up proposals for its reinstatement. This in common justice to the eminent men who prepared designs should be stated at the outset. Of these men there are known to have been three, Dr. Wren, Sir John Evelyn, and Dr. Hooke. Happily, I am enabled to reproduce the plans of Wren and Evelyn, but unhappily, although I am indebted to much courteous assistance on the part of the authorities of the British Museum and of the City of London, I have been quite unable to unearth either the plan of Dr. Hooke or the 'discourse' which Sir John Evelyn states he presented to the King 'with a survey of the ruins and a *plot* for a *new Citty*' (*vide* the entry in his Diary, under date September 13, 1666).

'It is an ill wind that blows nobody any good,' says the proverb, and certainly this applies in regard to the improvement of the streets of medieval London. Years before the Great Fire thoughtful men, such as the Fellows of the Royal Society whom I have mentioned, were much exercised in their mind as to what was to be done to improve matters both within and without the City. Sir John

* 'From Londinium to London.'

Evelyn, for example, who lived at his *country seat* at Deptford—just think of it !—has this note of the date May 14, 1662 : 'To *London*, being chosen one of the Commiss^rs for reforming the buildings, wayes, streetes, and incumbrances, and regulating the hackney coaches in the Citty of London, taking my oath before my Lord Chancellor, and then went to his Ma^ty's Surveyor's office in *Scotland Yard* about naming and establishing officers, adjourning till y^e 16^th, when I went to view how *St. Martin's Lane* might be made more passable into y^e Strand. There were divers Gentl^n of quality in this Commission.'

It is interesting to note that soon after getting to work the Commissioners found it necessary to give their attention to streets well removed from the City proper, in districts, indeed, rejoicing in the suffix 'in the Fields.' This the invaluable Diary already referred to shows us thus :

'I sate with y^e Commiss^rs about reforming the buildings and streetes of *London*, and we ordered the paving of the way from St. James's North, which was a quagmire, and also of the *Haymarket* about *Piqudella* (Piccadilly), and agreed upon instructions to be printed and published for the better keeping the streetes cleane.'

We further gain a glimpse of the character of the great 'Surveyor of the King's buildinges,' and are not surprised to find that of busy men and men of resistless energy he was the incarnation : 'May 5, 1681, came to dine with me S^r W^m Fermor of

Northamptonshire, and S^r^ Christ^r^ Wren, now building the Cathedral of S^t^ Paul, and the column in memory of the Citty's conflagration, and he was in hand with the Building of 50 Parish Churches. A wonderful genius bad this incomparable person.'

It is therefore right to assume that the plans presented were drawn up as much in fulfilment of exigencies existent, as in accordance with the views entertained by each as to the laying out of a hypothetical City. From this we learn much, and it is exceedingly interesting to be able to study how two of the three able men of the time attacked the problem.

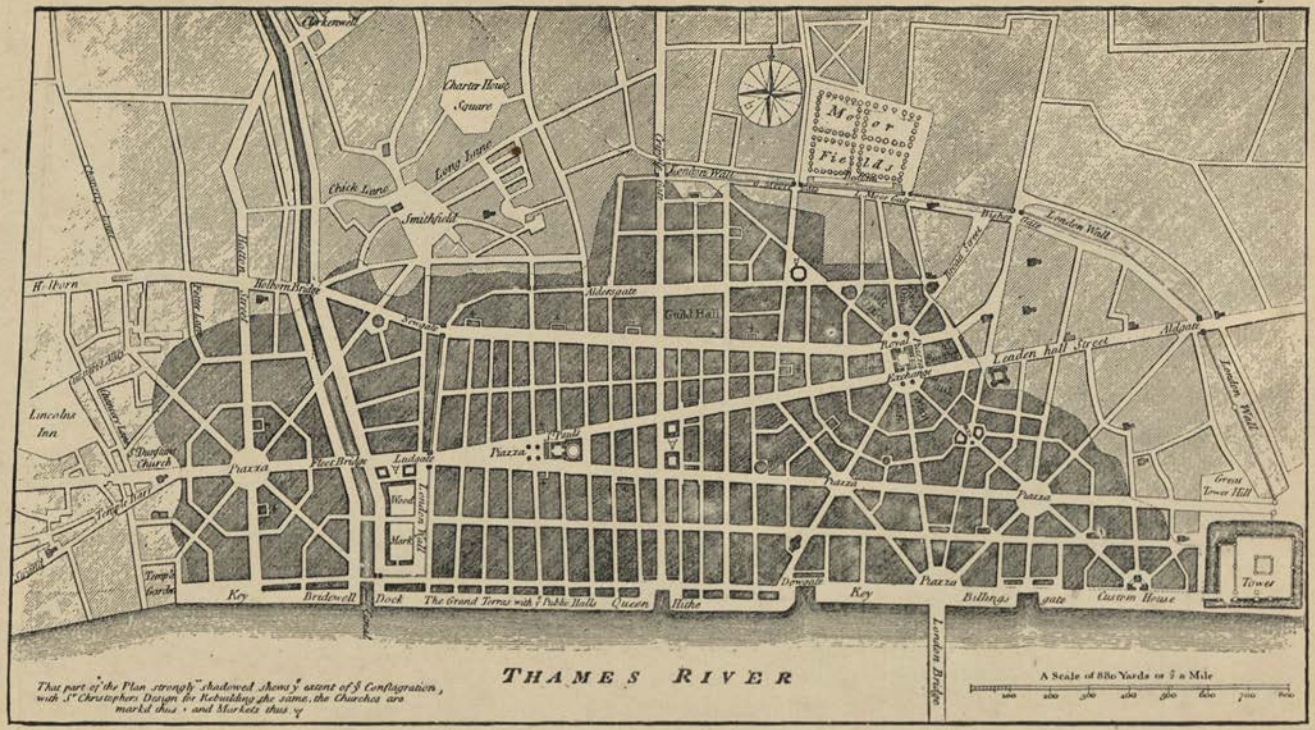
The laying out, in each case, commenced at 'the Tower' and terminated at 'Temple Barr,' for it must be remembered that although the Fire broke out at 'Pudding Lane,' close to London Bridge, and was arrested at 'Pie Corner,' a small turning now leading out of Smithfield, yet it extended, both east and west, considerably beyond those points.

In studying the two plans, we see they are characterized by one important difference; for whilst Evelyn sought to design a city of ideal symmetry, Wren strove to introduce uniformity and regularity in combination with an existing system of extra-mural highways, as well as the preservation of the general direction of the more important intra-mural arteries. This, I am persuaded, never presented itself to him in the light of an ideal town, but was the outcome of judicious mental compromise as

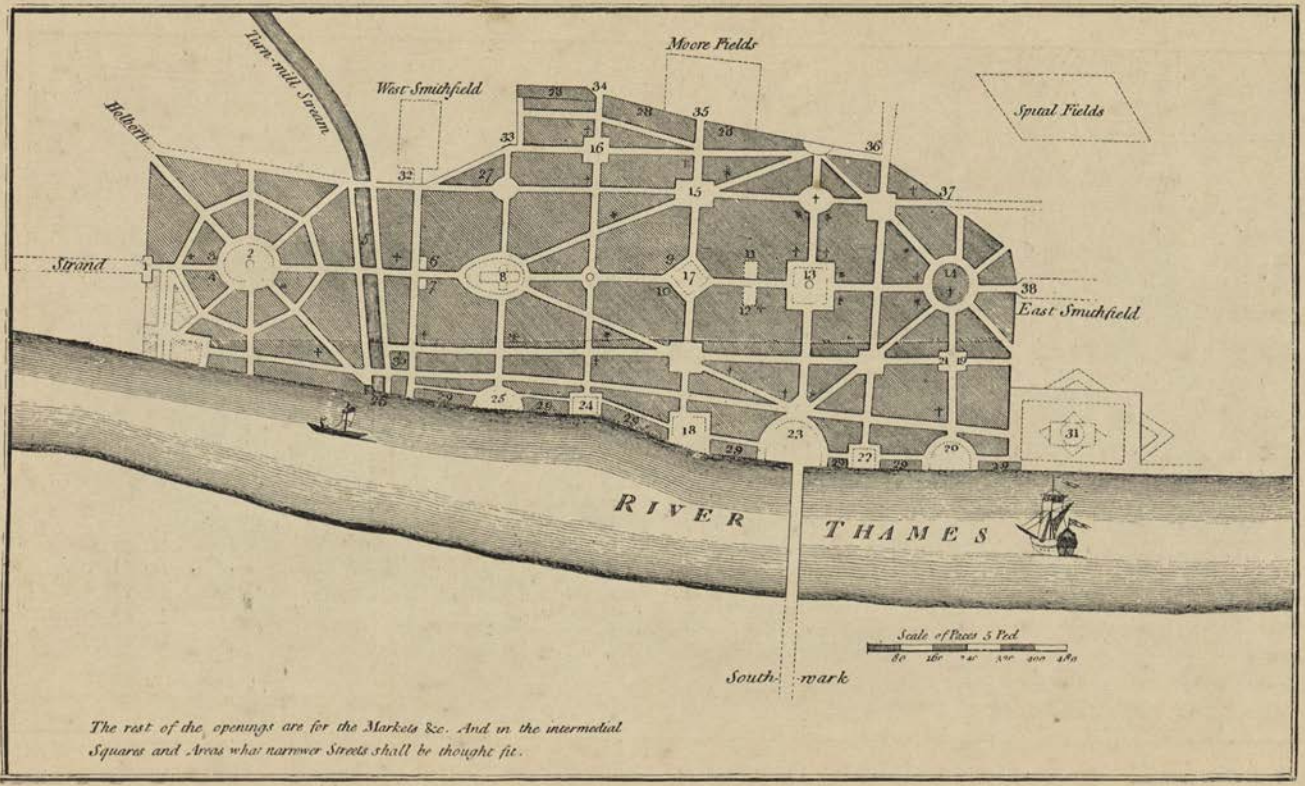
between future expediency and existing circumstances and exigencies; hence it is less ideal.

I deal with such points at greater length in the publication referred to, and it will therefore be sufficient here—as being more intimately connected with the object of this chapter—to point out the value the great master set upon *straight thoroughfares*. We observe that within the *razed area* all his streets are absolutely straight, the only deviation from this rule being observable at their ends, where such deviation was necessary for the purpose of connecting them with the existing extra-mural routes. Thus we find one great and straight thoroughfare piercing the wall at *Aldgate*, and, traversing the whole length of the city, leaving it at *Temple Bar;* another, entering the wall at the *Tower*, converging upon the former at St. Paul's, and passing out at the same historic portal; another, joining that entering by *Bishopsgate*, ran from the Royal Exchange square and left the City at *Holborn Bar*.

Exactly at the centre of his city he was enabled to get a thoroughfare at right angles traversing it completely in a northerly direction, and parallel with this he ranged his cross streets, thus forming a grid. Had this arrangement been carried out with appropriate width of streets—such as he would have wished—it is interesting to note that it would, by its style, have formed a fitting progenitor of the modern American cities which followed in its wake more than a century later.



Sir Christopher Wren's Plan for the Rebuilding of London.


Moore Fields
Thurn-mill Stream
West Smithfield
Holborn
Spital Fields
Strand
East Smithfield
RIVER THAMES
Scale of Paces 5 Perch
South-wark
The rest of the openings are for the Markets &c. And in the intermedial Squares and Areas what narrower Streets shall be thought fit.

Sir John Evelyn's Plan for the Rebuilding of London.

Perhaps even more interesting it is to note the scrupulous avoidance, upon the part of both Wren and Evelyn, of curved thoroughfares. It will be observed that such are conspicuous, in both plans, by their absence. Even the thoroughfares *surrounding* the proposed *piazza* in Fleet Street — which, strangely enough, should have occurred to both—are scrupulously straight. Both, it will also be observed, had recourse to radiating streets, similar to those of Athens and Washington ; those of Wren radiated principally from the *piazza* of the Royal Exchange, secondarily from the large *piazza* in Fleet Street (already referred to), and tertiarily from a pair of *piazzas*, one near St. Dunstan's-in-the-East in the present 'Eastcheap,' and the other about where Mansion House Station now stands, in clever conbination with a large crescent *piazza* close to the approach of London Bridge, and approximately where King William's statue now stands.

Thus we see Sir Christopher Wren would have bequeathed to London some half a dozen open spaces which might well have been embellished by public gardens. Evelyn would have, in this respect, been our most beneficent benefactor, for he provided for about a dozen and a half. To-day these would have proved as many public boons, eighteen unalloyed blessings. Evelyn indeed cast, *pro tempore*, exigencies to the winds, just as the engineer and architect of to-day will be able to do in regard to the design of Garden Cities ; and hence he produced a plan, charming in

its conception, convenience and symmetry. This I will allow the plan and its references to describe for themselves.

REFERENCES.

1. *Temple Barr.*
2. *Fleet Conduit.*
3. *St. Dunstans in the West.*
4. *Seargeants Inn.*
5. *The New Channel.*
6. *The Colledge of Physicians.*
7. *Doctors Common.*
8. *St. Pauls.*
9. 10. *The two Sheriffs of London Houses.*
11. *Mercers Chapel.*
12. *Bow Church and the Arches.*
13. *The Fountain in Grace-church Street.*
14. *St. Dunstans in the East.*
15. *Guild Hall.*
16. *Christs Hospital and Church.*
17. *The Lord Mayor's House.*
18. *The Royal Exchange.*
19. *The Trinity House.*
20. *The Custom House and Admiralty Court.*
21. *The Navy Office.*
22. *Billings Gate.*
23. *The Fish Market.*
24. *Queen-Hithe.*
25. *Paul's Wharf.*
26. *The Sluice.*
27. *Sessions House, Newgate Prison, Publick Work-House, and Bridewell.*
28. *The Church Yards and Inns.*
29. *The Key.*
30. *Black Friers Church and Watling Street.*

31. *The Tower.*
32. *New-Gate.*
33. *Alders-Gate.*
34. *Cripple-Gate.*
35. *Moore Gate.*
36. *Bishop's Gate.*
37. *Ald Gate.*
38. *Charles Gate.*

† *The several Parish Churches,* 20 *in Number.*

* *The Halls of the* 12 *Antient Companies.*

° *The Publick Fountains.*

One of these plans—that of Wren—was more or less adhered to in the rebuilding of London City. 'All, however,' the historian tells us, 'was not done that might have been done at so inviting an occasion; the former direction of the streets being too much complied with out of regard to private property. Had more powers been assumed in this respect, London might have realized the fable of the Phœnix, and rose out of its ashes unrivalled in beauty throughout the world. This design was not too great for the genius of the time, as two excellent plans were formed with this magnificent intention. Dr. Wren, afterwards the famous Sir Christopher, immediately after the Fire took a survey of the ruined spot by the King's order, and designed a plan for a new city. In this plan the irregularities in the old town were to be remedied by enlarging the streets and lanes, and carrying them as nearly parallel as possible, avoiding where conveniency would admit all acute angles. This he would have

effected by seating all the parochial churches conspicuous and insular; by forming the most public places into large piazzas, the centres of eight ways; by uniting the halls of the twelve chief companies into one regular square annexed to Guildhall; and by making a commodious Quay on the whole bank of the river, from Blackfriars to the Tower.'

Many of Wren's uncarried-out suggestions were, we see, admirable—as, for example, the grouping of twelve City Companies into a large and centrally-situated square around the Guildhall. Another was the suggestion to allot to all the parish churches 'conspicuous and *insular* positions.' What a glorious opportunity was thrown away, not only in connection with the fifty churches referred to by Evelyn, but also in regard to Wren's masterpiece of ecclesiastical architecture, St. Paul's Cathedral! So unhappily built in is this dominating and admirable piece of workmanship that we in our time have never been able to obtain a good and comprehensive view of it. One can form a fair idea of how greatly its grand architectural proportions would have been enhanced in their beauty and stateliness, had they been allowed to occupy a sufficiently 'conspicuous and insular' position, by the aspect of St. Peter's at Rome.

In this connection it has been in recent years more than once mentioned — notably when the agitation for the removal of the 200 tons of hideous railings with which it had been girt about, obviously

against Sir Christopher's desire, was in progress—that the great man of science and art would have had the space between the grand pile and the Thames left quite open, and laid out as gardens down to the water's edge, and even these gardens, we are given to understand, he would not have railed in, but instead would have delimited by means of handsome stone posts and rails such as came to be placed in front of the fane centuries after the demise of its author. This is likely enough, and would have proved of inestimable value to the modern city, as at once a beneficent 'lung' and a civic pleasance.

This being regrettably the case, I must leave the reader to paint upon his own mental retina the picture, the fine architectural effect, the vista would have produced. Looking up from the present mud banks, where should have been the suggested '*grand terrace* with y^e^ Public Halls' of Wren—grace to him—one's eye would have wandered through a large garden bounded by polished granite bollards, with their chains swinging, the one to the other, in graceful catenary curves, the ground welling upwards and terminating at the steps and porticoes of the majestic and time-hued fane. The idea was never carried out, and hence we are unhappily prevented from adding a photograph of the *fine* effect it would have presented. We can, however, offer one showing the *evil* effect of allowing Wren's masterpiece to have been built in.

Apart from historic interest, one must add, not only the influence upon the health and happiness of London's inhabitants of to-day the rejection of these plans has entailed, but the *enormous and almost incessant cost* of carrying out remedial measures. The immense expense now being entailed in obtaining direct communication south to north would have been avoided, the pitiable sight of struggling horses upon the steeper parts of Ludgate Hill and Fleet Street would have been obliterated, whilst the delay and great cost of constructing the present Victoria Embankment would have been vastly reduced. At that moment there existed both the space and the material, and we find Wren advocating and showing upon the plan his '*Grand Terrace*,' whilst 'the ingenious Mr. John Evelyn . . . beside lessening the most considerable declivities, proposed farther to employ the rubbish in filling up the shore of the Thames to low-water mark in a straight line from the Tower to the Temple, to form an ample Quay, if it could be done without increasing the rapidity* of the stream. The bason by this means,' he observed, 'might be kept always full and easy of access, like that at Constantinople.'

* Evelyn rightly foresaw that the narrowing of the Thames would materially increase its speed of flow—an effect much to be desired subsequently—but his fear was for the safety of the then existing 'London Bridge,' the narrow arches of which (see illustration) offered serious obstruction to the current, the bridge hence being subjected to great strain, especially in periods of flood.

Looking to the obverse, however, we see much to be grateful for, much to admire, for where was there another nation — engaged in foreign war at the time—which could so speedily have recovered from decimating plague, immediately followed by devastating fire, which could have recovered from the first, and rehabilitated themselves in a new city built upon the ashes and ruins of the latter, so cheerfully and without extraneous aid?

'By the prudent vigilance of all parties,' says the historian, 'London, to the amazement of all Europe, was in four years' time rebuilt in so different a style to what it was before the Fire, that those who saw it in both states could not reflect without wonder at the wealth that could sustain the loss, and bear so prodigious an expense as was laid out in restoring it.'

He then, in a few lines, tells us tersely facts, indubitably those which prevented Wren's plans being carried out in their entirety: 'One only objection occurred, but this was considered as unsurmountable: the obstinate aversion of the inhabitants to alter their old foundations, though it was proposed for them to give up their properties for a time into the hands of public trustees, to receive equivalents under a new plan. It was shown that by an equal distribution of ground into buildings, leaving out churchyards, gardens, etc., which were to be removed out of the town, there would have been sufficient room both for the augmentation of the streets, disposition of the churches,

halls, and all public buildings, and to have given every proprietor full satisfaction. Prejudice, however, which seldom fails to adhere to what is familiar to it, prevailed in this critical moment; the citizens would have their old city again; all therefore that remained was to give it whatever amendments its former irregularities might comply with.'

What applies to streets of continuous buildings would apply also to the avenues of detached residences in a Garden City. It may be urged that the façades of *some* of the villas could be better seen upon a curve. This, of course, is so, but it applies to only a limited number and to *one side* of the avenue only, what is gained upon one side being more than lost upon the other. An unfair advantage is given, so to speak, to a number of the inhabitants at the expense of the others.

One can picture the effect in a visit to the inner circle of Regent's Park. Here we have the case of a circular road, approaching a mile in length and of very noble breadth, about 100 feet, yet the greatest distance one can see—the finest vista obtainable when standing in the most advantageous position—is but 173 yards. Another disadvantage is that a circular road never looks its full width; this one can appreciate by remembering that the road we are now discussing is about the same width as Portland Place, yet it entirely lacks its boldness. The outer circle of Regent's Park is much more satisfactory; but this, in addition to its great

diameter, is due to the fact that it really consists—as is the case with the *Ringstrasse* of Vienna—of five practically straight roads connected up by means of long-sweep curvilinear corners.

The principal objections amongst others in regard to a circular city as proposed are: That its thoroughfares are robbed of their boldness, since it is obvious that the magnitude of a city so built can never be seen or appreciated, no matter how great the city may be, or how majestic and well placed its public buildings, for the range of vision must always be limited to the length of a chord of the exterior circumference of any one of its curved streets. To illustrate this let us take the case of, perhaps, the most imposing thoroughfare our great Metropolis possesses—namely, Regent Street. Standing at the corner under the *piazza* of the County Fire Office and looking along the curved thoroughfare we find that we are entirely shut in. We can see no outlet to the great street, and our line of vision is limited to the tangent or chord striking the western side at about the embouchure of 'Man in the Moon' passage. Now, the length of this chord is only some 150 paces, whereas the distance from Piccadilly Circus to Oxford Circus is 2,706 feet—roughly, half a mile. Contrast this with the view we get from the *same piazza* if we look through a *straight* street, viz., Waterloo Place (see illustration), when the eye ranges right across St. James's Park to the India Office.

Proceeding along the south west pavement, we, in

a few yards, experience a feeling of relief, for there the curvature ends, and we get a clear view, embracing the imposing façades of a mile of lofty buildings, with the great cupola of Salviati's, a view which, were it not for an unfortunate bend, would extend not only to Oxford Circus, but away beyond to the quaint, acute spire of All Souls in Portland Place. If, therefore, Regent Crescent were straightened out, Regent Street would become far more imposing. If we stand at the door of Walsingham House, Piccadilly, we see, perhaps, the most imposing façades in London, welling away over the hillock as far as the grim exteriors of Apsley House and St. George's Hospital. Piccadilly at this point, however, is only 69 feet wide, whilst Regent Street is 85 feet in width. One can thus picture how imposing would be the view in the latter great street were we able to stand in Piccadilly Circus and see completely through to Oxford Circus and beyond it. It is regrettable that All Saints should so project as to hinder the view of Portland Place—a noble thoroughfare—terminating in the verdure of Regent's Park.

The long vista of Regent Street, as seen from here, is very fine, exhibiting, as it does, a remarkable variety of architectural features. It was commenced in 1813, its massive buildings being erected principally from the designs of Mr. Nash, who deserves to be remembered as the author of this great Metropolitan improvement, and it was named from the

The Straight Part of Regent Street : Georgian Era.

92 A

The Straight Part of Regent Street—Early Victorian Era.

92 B

architect's patron, the Prince Regent. The expenditure of the Office of Woods and Forests in its construction was a little over a million and a half.

In his design for Regent Street, Nash adopted the idea of uniting several buildings into a façade, in order to preserve a degree of continuity essential to architectural effect; and it cannot be denied that he has produced an aspect imposing to the eye and greatly superior to that of any other thoroughfare of the then existing Metropolis—or, indeed, to any it is able to present to us up to the present time.

A notable feature of this noble thoroughfare is the cleanliness of its appearance. This is due to the fact that all the façades are painted white, and this, in its turn, is due to the circumstance that all the fronts are plastered. The contrast of painted 'plaster' in comparison with the dingy and dirty appearance of the brickwork in large towns has been greatly appreciated, and is alluded to in droll laudation in the following lines, written in 1826:

> 'Augustus at Rome was for building renown'd,
> And of marble he left what of brick he had found.
> But is not our Nash, too, a very great master?
> He finds us all brick, and he leaves us all plaster.'

The view from the portico of the National Gallery across Trafalgar Square, entirely through the length of Whitehall to the Palace of Westminster, may be cited as typical of the value of rectilinear thoroughfares, but the instances one might cite in our own country are lamentably few in number

as compared with those one may readily recall from abroad.

The fact that the outer side of a curved avenue is necessarily much longer than the inner side also gives rise to various inconveniences; houses built in areas having equal lengths of frontage cannot be placed opposite to each other, equal distances between gulleys, lamp standards, and the like cannot be maintained. Thirdly, if tramways be used the tractive energy required would be very greatly increased; indeed, to neutralize this, differentiation of the wheel-base should be resorted to, with increase of cost and complication. Fourthly, the safety of locomotion is impaired, speed of self-propelling traffic would have to be reduced, whilst the pleasure of driving—both horse and horseless—would be greatly lessened. Fifthly, if terrace-houses be built—a form of construction which in a Garden City should be prohibited, though it is noteworthy in the plan referred to: Mr. Howard shows not only terraces upon a sharp curve, but crescents in those terraces—the rooms, halls, and gardens alike become of an awkward shape.*

* It should also be remembered that since the date referred to in the next paragraph what one might call ready-made decoration has made great advances—such, for example, as in the production of ceiling decorations in relief, in such materials as Lincrusta Walton, Tynecastle tapestry, Anaglypta, and the like. These are now procurable in handsome rectangular design and panels, and such, obviously, cannot be used upon ceilings of irregular and curvilinear shape.

About the time of the Regency, architects gave much attention to crescent-shaped thoroughfares and crescent-shaped terraces, as evidenced by Regent Street and the very imposing crescent terraces erected at Brighton. It will be observed, however, that in the recent extension of the 'Queen of Watering-places' no recrudescence of crescent building has appeared, but, on the other hand, rectangular blocks of noble buildings facing upon imposing rectilinear avenues are the predominant features. Sixthly, the laying-out of a circular city is a much more difficult matter than a rectangular one, and it is not without certain other difficulties; for example, upon curves the laying of conduits, water and gas mains, electric-lighting mains, and the construction of subways, are all attended with added difficulty and increase in expense. Lastly, a town of circles, to be sightly and effective, practically demands a *plateau* for its emplacement.

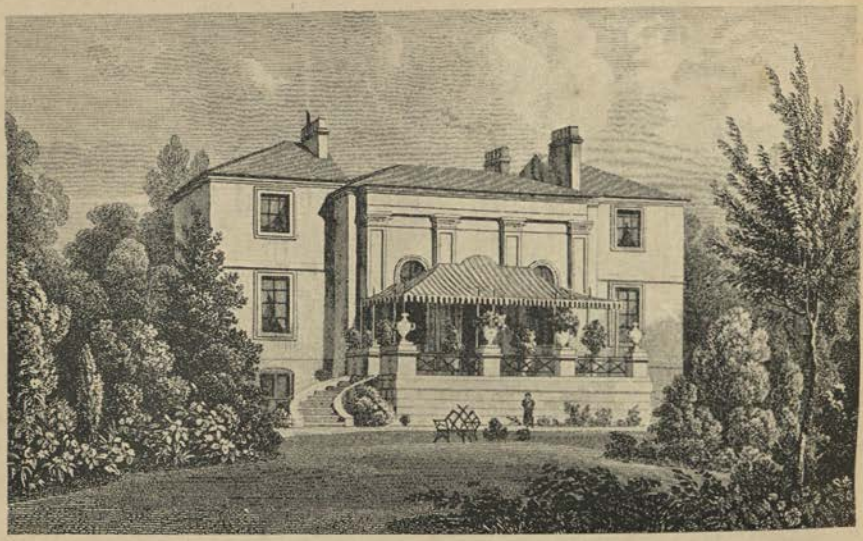
This as regards the circles! Concerning the thoroughfares* radiating from centre to circumference, these, whilst possessing the advantage of affording ready access from the outskirts to the centre, are otherwise inconvenient. Their convergence upon a centre entails every plot of land, for which they provide boundaries, being of an awkward and irregular shape; but, what is more

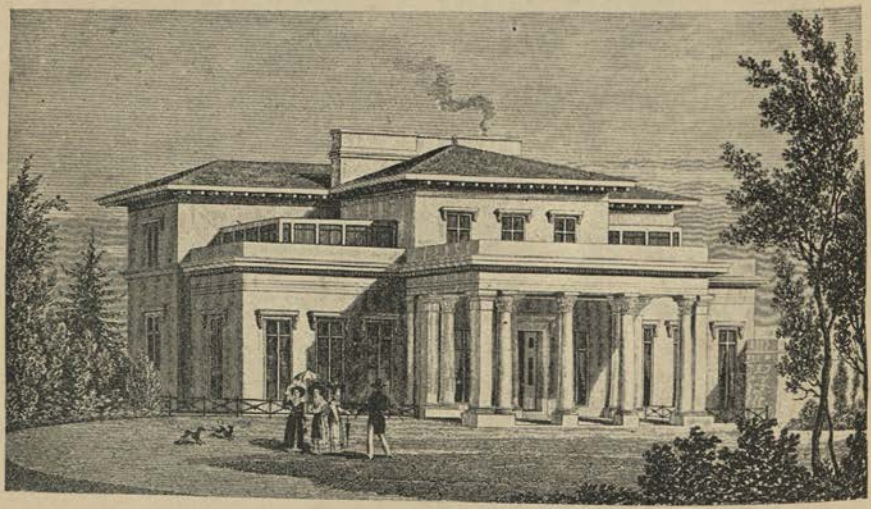
* These are styled by the author of the scheme *boulevards*. It would, I think, be better to avoid the use of French appellations in a modern British city.

serious, their number cannot be increased: the most that can be done is to insert between them shorter thoroughfares having a radial direction, but these, of necessity, must have *blind* ends—an objectionable feature.

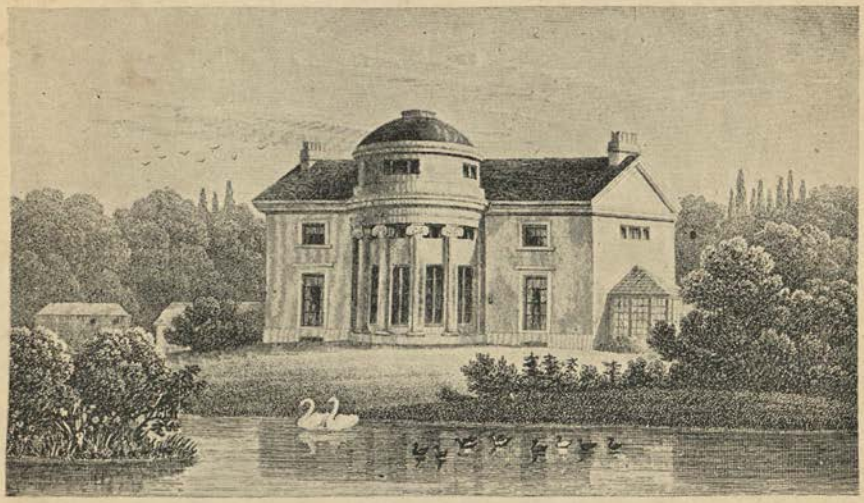
The radial thoroughfares are not, however, so efficient as at first sight they might appear. Mr. Howard limits his to six. At Athens there are virtually about the same number, and at Washington ten. In the rectangular plan I give in Plate VIII., which I consider particularly applicable to the site selected for the first Garden City, it will be observed that, without the wastage due to triangular open spaces and the inconvenience of awkwardly-shaped gardens and rooms, the centre of the City is connected to the outskirts by no less than *nine* thoroughfares of *minimum* length. Moreover, the centre there shown is the *commercial* centre—not merely an extensive garden surrounded by four public buildings.

One of the most important problems at the present moment occupying the attention of engineers is the regulation of the traffic in crowded thoroughfares. I have touched upon this burning question elsewhere, and will, therefore, only say here that the best preventatives are means which will obviate entirely the occurrence of 'cross traffic,' and the simplest and most ready of these is the provision of straight thoroughfares of ample width *in combination with circuses at each intersection*, such





Types of London Villas of the Regency Period, showing the severity of the Architecture adopted.



Types of London Villas of the Regency Period, showing the severity of the Architecture adopted.

circuses, preferably—as I have shown*—being furnished with 'islands' and gardens according to their size.

Lastly, there are two points demanding due consideration, in connection with what—without in any way suggesting want of confidence—may be looked upon more or less as an experiment—viz., the effect of the circular design upon the inceptive expenditure and the appearance of the City for some years to come during its development. A little thought will convince one that the circular delineation will greatly increase the difficulties of development as well as the initial outlay, for it is obvious that a circular road cannot well be commenced unless the authorities are prepared to complete it out of hand. If constructed by instalments—as a straight road may conveniently be—it would be most unsightly until completed, and during such intermittent lengthenings it would be most difficult to properly arrange a system of locomotion upon it. If constructed in its entirety, it must, of necessity, be a very long road, providing, in all probability, a frontage quite unwarrantable having regard to the area of land actually let. As to the appearance of the growing town, it is equally easy to see this would leave much to be desired. With a rectangularly laid-out town it is comparatively easy to arrange that the filling in of the cells, as it were, with buildings can be

* See Locomotion.

carried out with a fair approximation to uniformity, whilst unfinished straight roads of any length, each terminating in a vista of the open country beyond, would, in their incompleteness, present nothing objectionable. The cost and inconvenience of sewerage and its disposal, as well as of the laying of all mains, would be increased materially by the circular conformation.

To sum up, it may be said that the general convenience of cities is greatly enhanced by regularity in their design and straightness of their thoroughfares. It is always a good thing to be able to see well ahead, both into futurity and in a city, and as exemplifying its value an analogy may profitably be drawn with the convenience and inconvenience found in straight and curved railway-stations respectively, and, indeed, in extensive factories. In a straight-platformed station, for example, a single guard can conveniently start a train, but with a long train in a curved station four or five men are often required. One of the finest railway-stations in the kingdom is York; it is, however, marred and rendered far less convenient in use by the fact that it is upon a curve. One has only to contrast it with Liverpool Street or St. Pancras to see the force of my allusion. At Liverpool Street, standing upon the bridge, one can survey many acres of busily occupied space, yet one can, at a glance, see all that is taking place: one can see the approach of trains at a great distance upon all the many different 'roads.' And what

applies here applies in a great measure to roads and streets of towns. To facilitate rapid intercommunication, one should be able to see approaching persons and vehicles from a distance, not so much from the point of view of danger as from the great and unnecessary delays brought about by incessant stoppages, and from the immense amount of uselessly expended labour in the unnecessarily stopping and restarting of men and material, beasts and motors. To revert to York Station, it may be mentioned that the inconveniences arise from a curve of some 8 chains radius; now, this curvature would correspond to a circular road of nearly $1\frac{3}{4}$ miles in circumference.

Having now, I trust, brought sufficient evidence to bear upon the subject of design to justify my contention that it should be rectangular, I will pass on to the consideration of the ratios between the areas privately occupied and publicly utilized. This involves a calculation for which no rules exist. It can only be arrived at by means of a mental balance-sheet, with *ample* areas of open spaces on the one leaf, and prudent expenditure, both as to area and upkeep, upon the other. I have pointed out that the engineer who designed the fine city of Washington was ridiculed for his allowance under the first-mentioned head; but this has subsequently been found to have been a wise computation, the ratio being just under 2 : 1. Calculating Mr. Howard's diagram, we find the ratio works out to unity—that is to say, the land reserved for public use

amounts to that commercially utilized. It remains to be seen whether this large proportionate area will be carried out in practice. I, of course, greatly doubt this, and look upon it as extravagant, seeing that it is double that allowed by L'Enfant in Washington. It would mean not only extravagance in maintenance, but obviously would very materially cut down the earning capacity of the City. I must not omit to point out, however, in justice to Mr. Howard, that his diagram is 'merely suggestive.'

The width of streets is determined by two wholly different considerations. The first, that of proportioning them to the volume of traffic, or prospective expected traffic; the second, that of giving them increase of breadth for the purpose of increasing the boldness of their effect, and of providing a greater amount of open space *per se*. These two points will be dealt with in two subsequent chapters.

Having now dealt with the relative areas of streets, let us proceed to consider their construction, in order to determine whether or not it would be desirable to seize the unique opportunity offered, during the initiation of Garden Cities, to introduce a modification in the existing practice of street construction, in order the better to meet modern requirements, not only in regard to urban locomotion, but also in regard to better sanitation and the realization of more perfect hygienic conditions of town life. In regard to facilities of urban road locomotion, I have

elsewhere endeavoured to show that the ancient system of road construction is not the most suitable, and I have suggested a modification in regard to cross section, which will be found described in Chapter IX. This modification has met with gratifying approval by engineers, and I trust that both it and a system of automatic road cleansing I am now about to touch upon will be embodied in the laying out of Garden Cities, the two being designed to be adopted *pari passu*.

The points we should strive to attain in street construction are: (*a*) Facility for frequent and economical cleansing; (*b*) durability in relation to the traffic to be supported; (*c*) suppression of vehicular noise; (*d*) reduction of the necessary tractive effort of horses and self-propelling vehicles; and, lastly, the form of street affording the maximum of cleanliness combined with public comfort and convenience.

If we pause to consider why one or other form of street construction should be more or less prejudicial to health, we see that they are only indirectly so, the primary cause being the deleterious effect of the vast increase in horse traction. This is a growing evil, the more felt the more busy and prosperous the community, and in the beautiful balancings of Nature, which one constantly observes in evolution of every kind, it would appear that the advent of horseless road-locomotion has not been a day too soon. In this connection, therefore, I would direct the

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most serious attention of those in authority to this matter, and beg of them to take a broad-minded view of the imminent revolution — a revolution, indeed, upon which we have already entered—and to decide from the outset to arrange for and thus to foster a change beneficial at once to industry and national prosperity as well as to public health. I would go farther and impress upon them the advisability, in laying out their modern City, of reserving thoroughfares for the almost* exclusive use of horseless vehicles, to the end that the sanitary conditions of the principal thoroughfares would be greatly enhanced, whilst the cost of their upkeep would be enormously minimized. I am obliged to take this course from the undeniable fact that road surface the best suited for self-propelling traffic is that less well adapted to horse haulage. These points I deal with in Chapter IX., and will therefore proceed to describe the subway system of street construction and cleansing I advocate.

The great essential of street construction in my opinion is, firstly, that there should be nothing beneath the road surface which could ever necessitate the breaking up of the vehicular portion of the thoroughfare, even if, for some abnormal cause, the sidewalk pavements should have to be disturbed.

* The only ground upon which I would not make the rule exclusive is that it might cause some small measure of inconvenience in the case of friends driving in by horse to visit their acquaintances resident within the City.

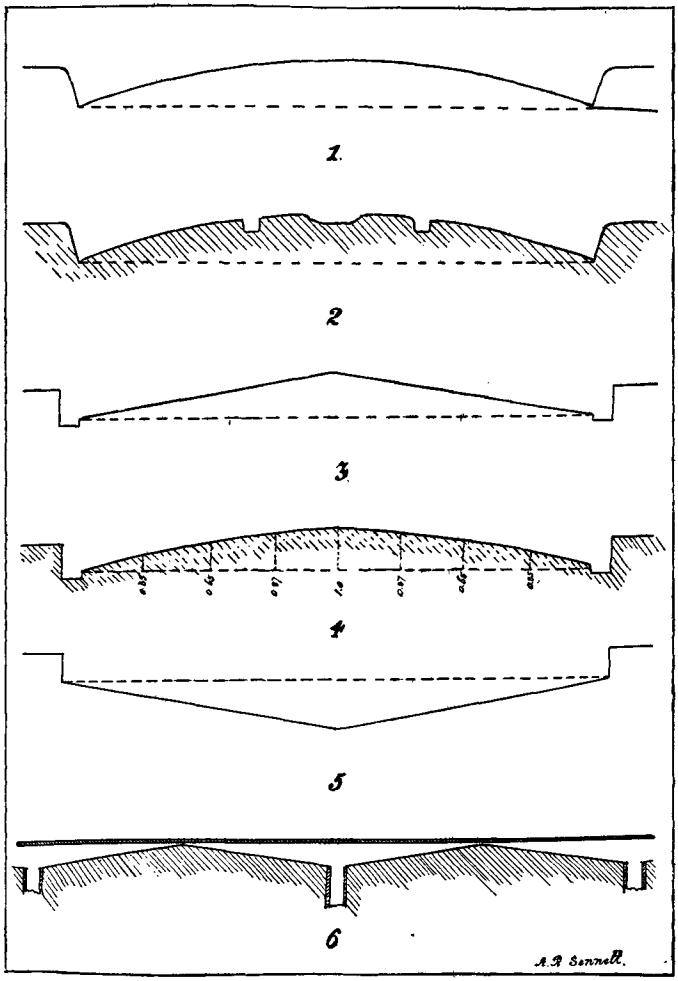
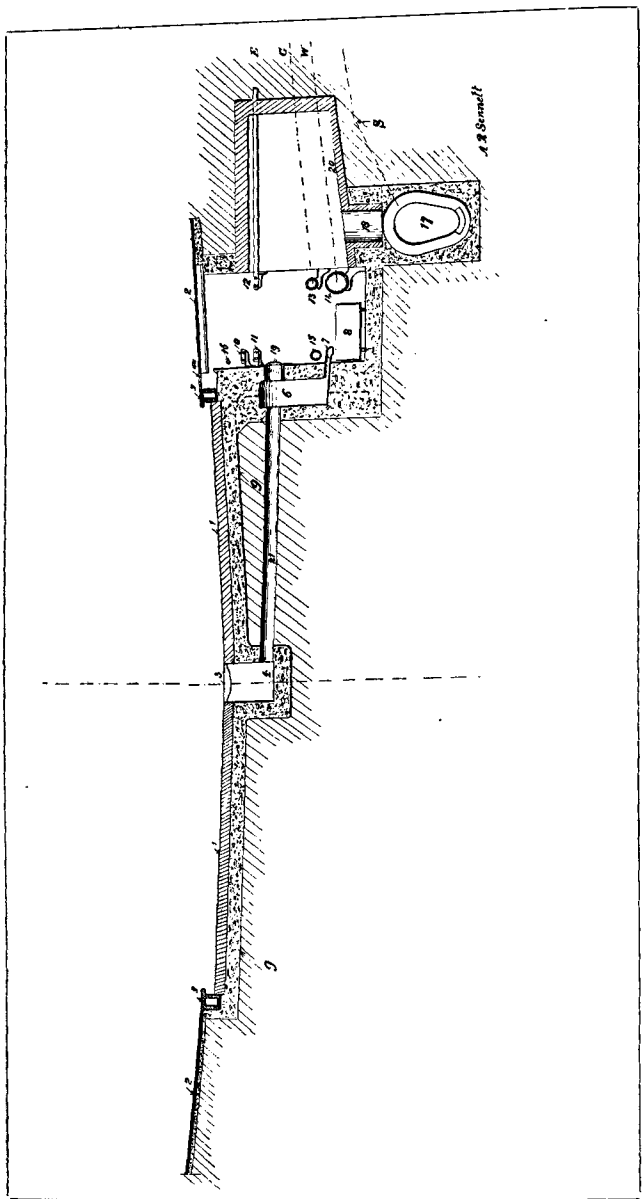


Diagram showing Cross-section of Ordinary and Invert Roadways.

(1) Ordinary country road ; (2) the same worn with waggon-ruts ; (3) diagram of 'crown' formed by two inclined planes ; (4) scientific form of road section, the parabola giving minimum tractive resistance ; (5) the two inclined planes inverted ; (6) longitudinal section of 'invert' roadway, showing continuous grid and inclined waterways leading to medial gulleys.

PLATE II.



Self-cleansing Street and Subway (Sennett).

Secondly, that all mains should be so disposed as to be capable of immediate inspection, repair, and renewal. Thirdly, that the removal of slop should be carried out from *below*, instead of from the surface.

Reference to the illustrations will show that in my system all the essentials I have set out are provided for. The mains, it will be observed, are placed beneath the sidewalks, as is also the main sewer. The invert form of road I advocate is clearly seen in the illustration and also in Plate II.; the paving is shown at 1.1, gently descending to the medial grid 3, running throughout the whole length of the thoroughfare. In the present form of road it is impossible to provide slopes longitudinally connecting the gullies, in order to provide for the rapid removal of storm-water; for it is obvious that the gutters must follow the rise and fall of the street, and it follows, in consequence, that the gutters must remain level where streets and roadways are level, with the great disadvantage that large volumes of water are caused to accumulate along each side of the roadway. It will be seen from the illustration that this imperfection in construction is got over, for the surface of the subterranean gutter 4 may be at any depth required beneath the grid 3, and consequently the inclination of the gutter, as shown longitudinally in Plate I., may be of any steepness it may be thought advisable to give it. The hollow curb employed for washing down the streets, in lieu of water-carts, is shown at 5.5.

I will now explain how the scavengering is carried

out from beneath, instead of from the surface, as has heretofore been the case. Each gully, of which three are shown in Plate I., is connected by a transverse pipe 21, by which the storm-water passes into the syphon-chamber 6. This, as will be seen, instead of being the usual stoneware chamber, is merely a cavity formed in the wall of the subway. The storm-water leaves this cavity laterally in the ordinary manner by a pipe built into it at the point marked 6, so that the chamber remains nearly full of water, from which the sediment is precipitated in the ordinary way, and accumulates in the lower part. This in ordinary practice has to be removed from above, by men provided with long ladles, the operation being a source of inconvenience; and where horse-drawn traffic exists it must always be also an offensive one. To remove the sediment from below, a scavengering truck 8, running upon a light tramway in the subway, is provided, and this truck or tank is of such a height that it just passes beneath the bib of the disgorging pipe built into the bottom of the syphon cavity, and provided with a sluice-valve at 7. To provide a means of entry, the cavity is furnished with a manhole and door 19, and this is placed immediately in front of and on a level with the pipe 21, so that the latter can be from time to time cleansed with the ordinary sweep's machine, for the manipulation of which the side-passage affords ample space.

In all the subways yet constructed the venti-

lation has been carried out by gratings inserted in the roofs. This system possesses the great disadvantage that the tunnels cannot be kept dry, since the rain enters through these grates. I get over this trouble in ventilating the subway by means of rectangular grids 22, about 1 foot or 15 inches wide, by any length it may be thought desirable, inserted into the sidewalk alongside the curb. Rain-water entering from these falls into a gutter formed upon the top of the retaining wall, and from thence into the syphon cavity 6.

The subway is constructed entirely of concrete, and consists simply of a buttressed retaining wall, separating the roadway from the pathway, and another of light construction forming the inner wall of the tunnel. The concrete of the retaining wall is made in one with the concrete foundation of the roadway 9.9, as well as the culvert 4. The only brickwork is that of the side-passages, one of which is shown in the plate. The sidewalk is carried by light girder-irons, one of which is shown, filled in with concrete, supporting the asphalt pavement shown by the dark line 2. The through mains, such as the high-pressure hydraulic main 15, for fire hydrants, elevators, etc., the electric-power and tramway mains 11, telegraphs and telephones 10, and pneumatic despatch 16, are ranged along the outer wall of the subway, whilst those from which services have to be taken off are carried upon brackets projecting from the inner or house-side

wall. The water main is seen at 14, the gas main at 13, and the electric-lighting mains at 12. The advantage of this system is that not only are the necessary connections made within the side-chambers, but all the services can be laid, and subsequently got at throughout their whole length to the houses, in one trench. Thus it will be seen that in digging down to the services we should first come upon the electric-light service, at E, which we should find to one side of the trench; then, at a slightly lower level, the gas service G, which we should find at the other side of the trench; and below this, again, but at the opposite side of the trench, we should come upon the water service W.

The sewer, instead of being placed under the floor of the subway, I recommend to be placed as shown at 17—viz., just without the subway—its concrete encasement forming part of the concrete of the inner wall, and at the same time serving as footings for the latter. The advantage of this disposition is that the sewer may be entered from the descending shaft 18, provided with a hermetically sealed cover, and this may be removed and left off without interfering with circulation of men and trucks through the subway. The connection between sewer and house drain is made at S, to facilitate which the brick floor 20 of the side chambers is laid dry. The plate represents a section through one of the buttresses of the subway retaining wall, made sufficiently thick to provide the syphon cavity

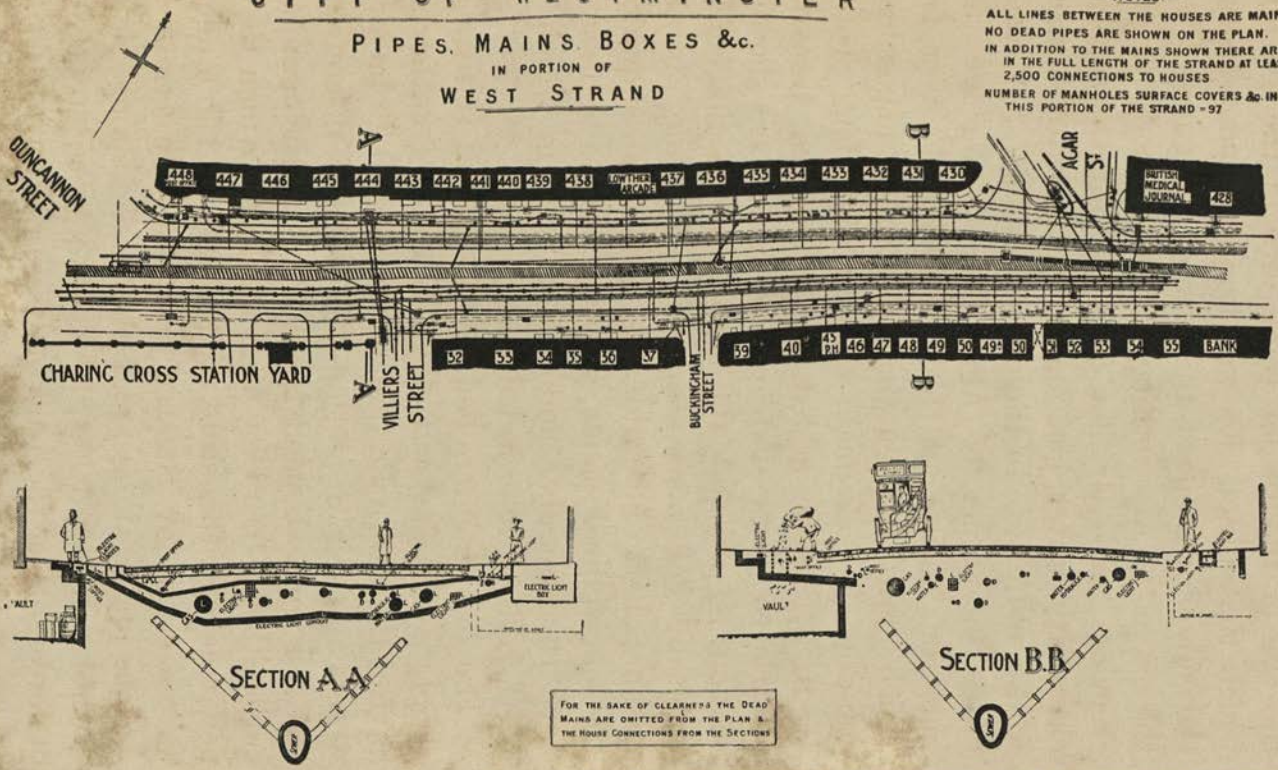
6, and hence shows a mass of concrete nearly double as thick as the actual wall, the thickness of which, together with the footings, is shown by the dotted line.

I should imagine there is no instance of more lamentable waste of public money than the incessant breaking up of the expensive road pavements now to be found in all large cities, to say nothing of the great inconvenience and consequent dislocation of traffic and the loss it entails. In a new city, therefore, every endeavour should be made so to collate the various undertakings necessitating the laying of underground mains of every kind that under no circumstances of repair, renewal, addition, or maintenance should it be necessary to disturb the surface of roadways. Consequent upon the strides made by modern science in the introduction of electric lighting, electric telegraphs, telephones, fire alarms, pneumatic despatch-tubes, and other attributes of the modern city, in addition to the older services of gas, water, and sewage, this street-breaking evil has become one of burning import—one, moreover, which can only be obliterated in existing cities at enormous expense.

The uninitiated, I fear, can form but a very inadequate mental picture of the *crowded* state *below* as well as above the surface of the important thoroughfares of our great cities. By the courtesy of Mr. J. W. Bradley, M.I.C.E., engineer to the City of Westminster, I am enabled to present to

the eye of the reader some idea of the extent to which the subsoil of a well-known London street—the commencement of the Strand—is crowded with the mains, to say nothing of the far more numerous 'services' necessary for carrying out the supply of electricity, water, gas, and the other attributes of a well-found city. In the cross-section *B*, *B*—namely, near the corner of Agar Street—we see these numerous mains cut through and endwise on, from which it will be seen that it is almost impossible to cut down to one main without disturbing another. If to these be added the numerous transverse electric conduits—two only of which are shown in section *A*, *A*—and the proper proportion of the thousands of house-services, the thing becomes nothing short of bewildering. The plan shows only the longitudinal mains, yet it serves to impress one with their number and the manner in which the earth is literally crowded with them.

The evil is intensified by the fact of the various supply companies, as well as the postal authorities, having their own Parliamentary powers to break up streets at their discretion—or want of discretion—and this quite beyond the control of the municipal authorities. In a City such as that of which we are now treating, this state of things would in a degree be mitigated by the trustees being owners of the various undertakings, and therefore able to exercise control. Nevertheless, it would evince gross want of foresight on the part of those responsible for the


CITY OF WESTMINSTER
PIPES, MAINS, BOXES &c.
IN PORTION OF
WEST STRAND
—NOTES—
ALL LINES BETWEEN THE HOUSES ARE MAINS
NO DEAD PIPES ARE SHOWN ON THE PLAN.
IN ADDITION TO THE MAINS SHOWN THERE ARE IN THE FULL LENGTH OF THE STRAND AT LEAST 2,500 CONNECTIONS TO HOUSES
NUMBER OF MANHOLES SURFACE COVERS &c IN THIS PORTION OF THE STRAND - 97
DUNCANNON STREET
CHARING CROSS STATION YARD
VILLIERS STREET
BUCKINGHAM STREET
ACAR ST
BRITISH MEDICAL JOURNAL
BANK
VAULT
ELECTRIC LIGHT BOX
SECTION A.A.
SECTION B.B.
FOR THE SAKE OF CLEARNESS THE DEAD MAINS ARE OMITTED FROM THE PLAN & THE HOUSE CONNECTIONS FROM THE SECTIONS

Plan and Sections of a Portion of the Strand, London, showing the Overcrowding of the various Services.

design and laying out of the City were they to enter on their work upon the lines which have proved so disastrous to other towns in this regard.

Engineers are agreed that there is but one antidote to the trouble—namely, the laying of all mains in subways, and the design of such subways cannot receive too great an amount of thought on their part.

An entirely unforeseen inconvenience—indeed, danger—has recently manifested itself in connection with the supply of the heavy currents of electricity now required for the various modern urban services, such as the running of tram-cars and the supply of electric light and motive power. I refer to the phenomenon of terrestrial electrolysis. This electric action manifests itself in the unpleasant form of enspongification and eventual puncture of the gas and water mains laid in ground through which return electric currents and leakage electricity pass. To what magnitude of damage, public inconvenience, and monetary compensation this incisive and unwonted electrolytic effect may attain in pipe-traversed towns it is quite impossible to foresee; but it is clear that such destructive action could be effectually arrested by the provision of subways such as I propose, and thereby two great problems could be solved at the same time.

Few cities have yet adopted anything approaching a complete system of service subways; for this, however, ample justification exists, the enormous

expense of the conversion of existing streets, the serious and prolonged dislocation of the traffic, the interference with, and inestimable amount which might have to be paid in compensation in regard to, vested rights, may be cited as some of the obstacles —almost insurmountable. The history, therefore, of this important subject is very short, and will be found given in full in Chapter IX.

Let us now consider the effect of this *invert* contour upon scavengering. In the present system the mud and dust are swept *from* the centre of the street *towards* the footpaths, along which it is caused to accumulate either in the form of dust-heaps or 'mud puddings.' The removal of this dust and mud pudding, or 'slop,' are operations which cause considerable inconvenience to pedestrians; traffic is prevented from approaching the curb, and is blocked by the slow and intermittent progression of the mud-carts, whilst the curbs and edges of the pavement are besmeared with mud, the users oft-times themselves becoming bespattered. On the other hand, with a medial grid and the scavengering subway I propose—and hereinafter describe—the mud-carts and the scavengers slopping the streets would never be seen in Garden City, whilst the inconveniences to pedestrians would also be entirely obviated. What applies to mud removal applies with equal force to the removal of snow. The present practice is to throw up great embankments of snow parallel with, and necessarily close to, the

curb. These heaps cut off communication with the roadway, cause streams of water impassably wide to flow at each side of the street, and occasion much inconvenience to pedestrians whilst the snow is being thrown up into carts, in itself a costly operation. With the central grid system I propose, snow could be cleared away as quickly as it fell by means of a motor-plough, which would push it towards the centre of the highway—where it would cause but little inconvenience—and channels having been chased in it, the snow would automatically remove itself by the water of liquefaction running directly down the medial grid, whereby very heavy expenses borne by other cities would be entirely avoided.

From the point of view of watering and cleansing, this contour of road surface offers the very greatest facilities. The water-cart constitutes a clumsy and not very efficient method of washing streets. In Paris and other cities preference is given to the hose, which is a more powerful detergent appliance. Attempts have been made to abolish both by the employment of a road-watering curb. The watering curb, however, has not proved thoroughly successful in streets of usual form. The reason for this is very obvious—viz., that the water emerges from the very place where it is required to collect, whilst the débris is at first washed *away from* the very place—the gutter—where it is required to be driven. In an 'invert' street, it will be seen, all these objection

are removed, the street can be thoroughly and instantaneously flushed, and the débris driven to the centre, where it disappears beneath the surface.

With regard to horse-brushing the advantages are also obvious. In a modern city all the operations of scavengering ought to be performed mechanically. The motor water-cart, the steam dust-and-slop cart, have already proved themselves economical and time-saving devices; the step to horseless road-brushes and machines, which will automatically and at the same operation sweep and pick up dust and slop, does not offer any insuperable difficulty. With the system I advocate, however, the necessity both for lifting and transporting dust and mud in the streets themselves is entirely obviated. The troublesome, and ofttimes offensive, operation collateral with scavengering—of removing the precipitate from the siphons—is also removed from the eyes—and noses—of the inhabitants.

All these advantages—it need scarcely be pointed out—could be secured in Garden Cities at a fraction of the cost they would entail in existing towns.

Having arrived at an approximation of the ratios to exist between the areas publicly and privately occupied, the next question arising is, What proportion should thoroughfare area bear to the total of open space? for it is obvious that this total area might be made up in two ways: (*a*) By narrow thoroughfares and abnormally spacious parks; (*b*) by abnormally wide thoroughfares and more restricted

parks. It is equally obvious that the one would be more costly than the other, both in installation and upkeep.

Here is presented a typical case in which, as I have mentioned, a compromise must be made between boldness of conception and prudence in expenditure; also is presented a case where the relations between capital expenditure and subsequent upkeep should be most carefully analyzed, for it so frequently happens that saving in first cost entails a quite disproportionate increase in subsequent and never-ending expenditure in maintenance.

There is probably no matter in connection with which this applies more forcibly than in regard to roads, and in comparing wide roads and large parks one observes that the conditions are inverse—that is to say, increase of expenditure in the laying out of a park means increase in cost of upkeep, but with roadways the reverse obtains. The greater the expenditure upon the production of a perfect road surface, the less the cost of upkeep, and this most markedly. Obviously, the more elaborate the park, the more profuse the flower-beds, the broader and longer the walks, the greater the annual expenditure must needs be. With roads and pathways, the greater the area paved with wood and asphalt, with proportional extinction of macadam carriageways and gravel footways, the less the annual expenditure upon upkeep. The economics of the question therefore demands a judicious balancing

of interest and amortization as against cost of upkeep.

This is the broad principle, one, however, immediately vitiated by another consideration, and this of absolutely paramount importance—the consideration of health. An eminent authority on road construction* made use of the following remark in reference to the time-honoured macadam, the merits of which still stand unchallenged in regard to rural highways, but which increase of traffic and modern sanitation pronounce unsuited to urban requirements: 'Its dirtiness consists not only in the excessive and impure dust of dry weather, but also in the facility with which organic impurities are absorbed by it, decomposed within it, and exhaled to the atmosphere. In country and in some suburban roads the extent of this objection is insignificant, and no other pavement is better than well-maintained macadam, but in some of the carriageways of the West End of London one would regard it as intolerable, had it not been tolerated so long. To the unsophisticated provincial the manner in which, on a hot July day, fashionable London rolls over her tainted macadam pavements, apparently without even smelling them, is a mystery almost as great as surrounds the fact that the Metropolis, alone among the great centres of civilization in this country, if not in the world, still submits with

* Mr. Geo. F. Deacon, *vide* Minutes of Proceedings Inst. C.E., Session 1878-79, Part IV.

apparent satisfaction to an intermittent water-supply.'

The truth of this assertion cannot be gainsaid, and I would most earnestly ask that a patient hearing be given to my plea that improved methods of street and road construction should—*from the outset*—find place in the first Garden City. I plead it most earnestly on the multiple grounds of expediency, of economy in traffic traction and its upkeep, of cost of maintenance, and of public convenience, and again upon the higher grounds of improved sanitation and diminished civic mortality.

As to the first—expediency—it is, I am sure, most advisable that the first Garden City should set an example in respect to the adaptation of modern science to the needs of its daily life. As to the second—economy in traffic traction and its upkeep—the general reader is probably entirely unaware of the enormous difference made in this respect by the class of road surface chosen.* As to the

* The best paved and maintained streets in the country are probably those of Liverpool and Manchester, especially from the point of view of heavy traffic. I will take a typical example from the first. Some years ago, when a modification in the method of laying the granite sets was entered upon—namely, in substituting for a 'hand-pitched' foundation one of Portland cement or bituminous concrete, and in replacing gravel joints by asphalt joints—an extraordinary economy was effected. The ordinary load of a pair of horses was increased by about a ton; of a single horse by about half that amount. The speed of traffic was also increased, whilst the cost of maintenance of

third—cost of maintenance—I shall have no difficulty in showing this to be greatly in favour of the improved road surface; as to the fourth—public convenience—it needs no words to picture the boon to the inhabitants, of dustless and mudless streets and thoroughfares; whilst as to the fifth—improved sanitation — it requires not a moment's reflection nor a day's observation to prove to us how thoroughly unsanitary are all surfaces which are in any degree absorbent of the *excreta* of horse-drawn traffic. The requirements of improved sanitation are certainly not met by the incessant scavengering, be it in the dangerous sweeping-up of dust or the dirty process of mud-slopping—well indeed might Dr. Richardson speak of 'that disgrace to our modern civilization, *the mud-cart*,' which, as he pointed out, has long since been banished from the streets of Paris. As to mortality, nothing could be more conducive to the spread of disease—nay, to its inception—than that dust, containing a high percentage of pulverized *excreta*, should be thrown into the air to enter the eyes and to be inhaled into the lungs, or that the soles of one's boots should become sodden with evil-smelling mud. Statistics are probably not yet forthcoming as to the actual

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vehicles was reduced, with a considerable saving in horse-flesh. Excluding any consideration of the last-mentioned, however, but taking only the actual cartage rate of 1s. 6d. per ton, there was a saving in cost of cartage alone exceeding £10,000 a year for each mile of pavement so modified.

effect upon the death-rate, but no very vivid imagination is necessary to appraise the outcome of the malevolent conditions.

'Gutter children,' remarked the hygienist I have referred to, 'are an impossibility in places where there are no gutters for their innocent delectation'; a truism we should all like to see realized. I will therefore proceed to describe a gutterless and self-cleansing street, from which alike the dust-sweeper, the mud-scraper, the scavenger, and the mud-cart are banished.

Reference to Plate II. will serve to show that in place of a curb-'stone' the curbing is composed of a hollow edging of mild steel (5, 5).* This is in connection with the water-mains, and can be filled as an ordinary pipe when required. The curbing is provided with a projecting 'nosing,' against which the wheels touch. Protected beneath this nosing are a number of water-jets. When the roadway is either dusty or muddy, the water is turned on in sections, and, as it rushes down the slight incline from the curbs to the medial grating, it carries all *débris* before it, and this disappears with the water down through the grating (3) and, travelling lengthwise of the road, into the gulley (4), from which it is

* Steel edging has been used for many years, by way of 'fender' to curbing, in busy thoroughfares, especially upon bridges. Instead of rapidly eroding away, as is the case even with granite, by the grinding of wheels of heavy traffic, it becomes bright, and very materially reduces the friction as between wheel and curb.

removed in the manner already described. If such a roadway, having a surface of asphalt, were properly put down and reserved exclusively for indiarubber-tired, horseless vehicles, it would be as hygienically perfect as the means at present at our command could possibly make it. The cost of its upkeep from depreciation would be infinitesimal, and it would require no attention during the day. The only thing necessary would be an occasional rotary-broom brushing during the night.

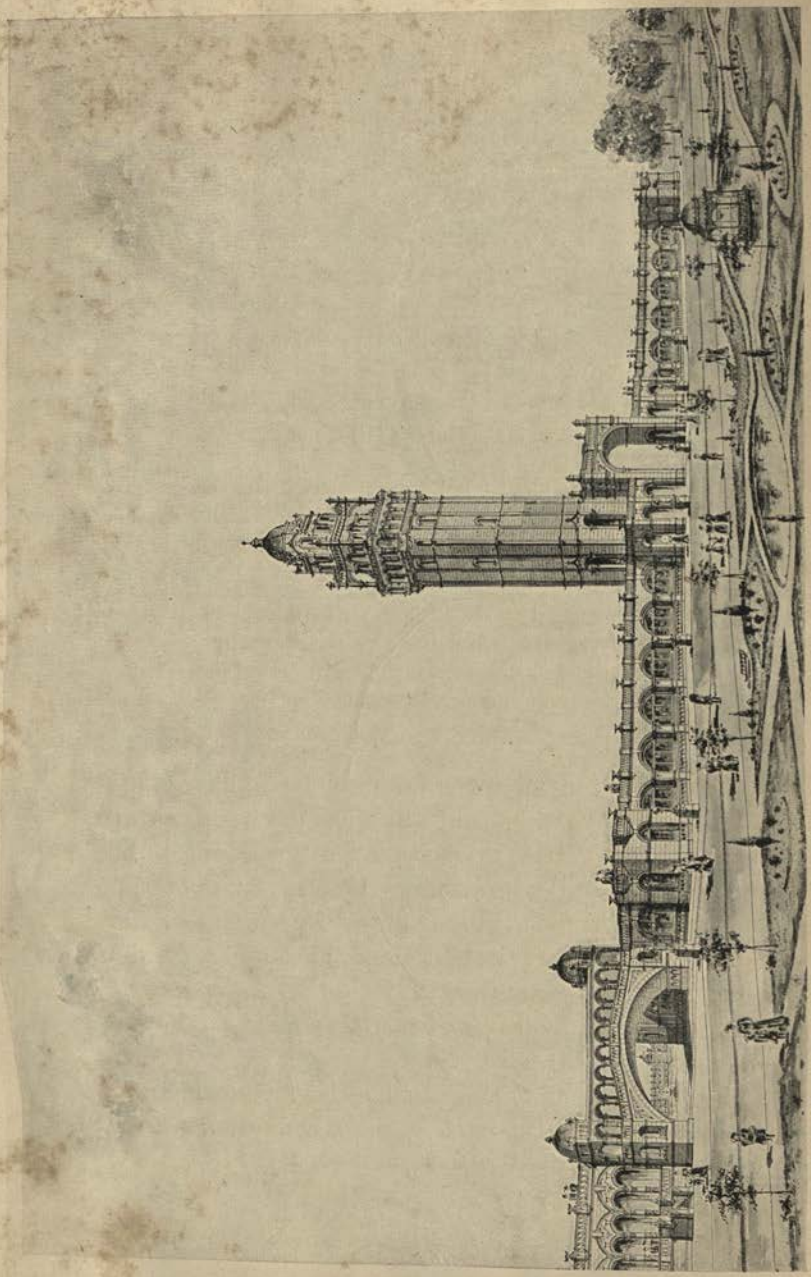
Although this modified form of roadway would afford the advantages enumerated, there is nothing so very revolutionary about it. This will be seen if the reader will kindly draw a line through the centre of the concavity, and then, in the mind's eye, transpose the one half to the other; the effect of this, as will be seen, is to reproduce a road of ordinary convex curvature. This being so, there is not the least risk in its adoption. The difficulty lies entirely in the *opportunity*. It is obvious that there *is* a difficulty in adopting it in existing towns because of the 'break' between the two systems—just such a difficulty as is experienced in the 'break of gauge' in tramway systems.

This points to the great desirability of making the change during the inception of a Garden City, because there would be no hindrance of any kind. Opportunity, says the English maxim, is a great thing! I trust the directors will seize upon it. I would remind them of the still more expressive

maxim from the Latin: 'Opportunity has hair in front, behind she is bald; if you seize her by the forelock you may hold her; but, if suffered to escape, not Jupiter himself can catch her again.'

It is therefore with a feeling of much gratification I learn that the Health Committee of the Garden City Association has recommended its adoption, because this is confirmatory of the views I have ventured to express concerning the sanitary and hygienic value of the 'invert' system.

It will, I trust, not be thought because I have laid stress upon science—as it is that with which I am more intimately connected—that I underrate the vast 'opportunity' the inception of a Garden City offers to art. Artists and architects alike are agreed upon this. Decorative artists have of late undoubtedly taught valuable lessons, not the least of which has been the demonstration of the fact, not sufficiently well appreciated, that an artistic thing need not, of necessity, be an expensive thing. Good taste costs much to acquire, but it need not in the application. For taste displays itself alike in little things as in great. Art, indeed, is built up of an agglomeration of small details—carefully worked-out details—blending to form one harmonious and beauteous whole. Here, then, is a grand opportunity for our architects and artists! May they be successful in such a promising field as the laying-out of a Garden City.



First Stage in the Development of the 'Capitol' during the Inception of the City.

CHAPTER III

PROPOSAL FOR PLAN OF FIRST GARDEN CITY

My Lord of Verulam quaintly taught 'the past ever deserves that men should stand upon it for awhile to see which way they should go, but when they have made up their minds they should hesitate no longer, but proceed with cheerfulness.'

'The wise and active conquer difficulties
By daring to attempt them; sloth and folly
Shiver and shrink at the sight of toil and danger,
And *make* the impossibility they fear.'

'*À cœur vaillant rien d'impossible.*'

In the preceding chapter enough, I think, was said to indicate why it was that the ancients were enabled to lay out their cities upon a plan in grandeur, public convenience, and admirable symmetry far exceeding that of our modern cities. Two important factors were involved, and it is indeed pleasing to reflect that these two essentials have, quite unexpectedly, recrudesced in connection with this most modern of schemes—the Garden City.

The two *sine quâ non*, as has been shown, were a suitable site and a *carte-blanche* commission to a

Hippodamus or a Leonardo da Vinci to produce an apposite plan. Doubtless there was a *Senatus*—a *summum concilium* who pronounced the *ultima ratio regum*, and in this, again, history will repeat itself in regard to Garden Cities. Let us hope that in this combination of counsel 'wisdom will be found.' The motto of procedure might well be *Consilio et prudentia.*

Let us exhort each, therefore, to 'sink not in spirit; for who aimeth at the sky shoots higher much than he that means a tree'; and remind all also of the words of Lord Chesterfield: 'Those who aim vigorously at perfection will come nearer to it than those whose despondency makes them to give up its pursuit from the feeling of its being unattainable.'

The work of the civil engineer ends where that of the architect begins. The one lays out the land for the dwellings, the other lays out the dwellings for the populace. The domain of the engineer is 'to control the great sources of power in Nature for the use and convenience of man';* that of the architect, to combine the materials of nature for the habitation and comfort of man.

The one by the very nature of his calling must be *quasi* iconoclastic, the other should be preservative of Nature and ministrative to beauty in both Nature and artifice. It is not my intention to trespass beyond my own domain, that of the laying out,

* *Vide* Charter of the Institution of Civil Engineers, 1828.

farther than a few remarks, by which I may draw analogies concerning different matters from different countries, and in relation to things which might be, in comparison with things which have been.

That, as a nation, we are inartistic cannot be gainsaid. Far be it from me, however, to suggest that we are wanting in artistic appreciation. We possess the artistic feeling, but until quite recently we have found ourselves unable to give it expression in material form. No nation can be more appreciative of art, for no other nation has expended a fraction of the care and wealth we have done upon the collection and purchase of things of *virtu*. The ugly walls of our nineteenth-century houses have enclosed a fabulous wealth of works of art. Fleets of argosies have sailed to our shores laden with objects of beauty, artistic entities prepollent to elevate the mind.

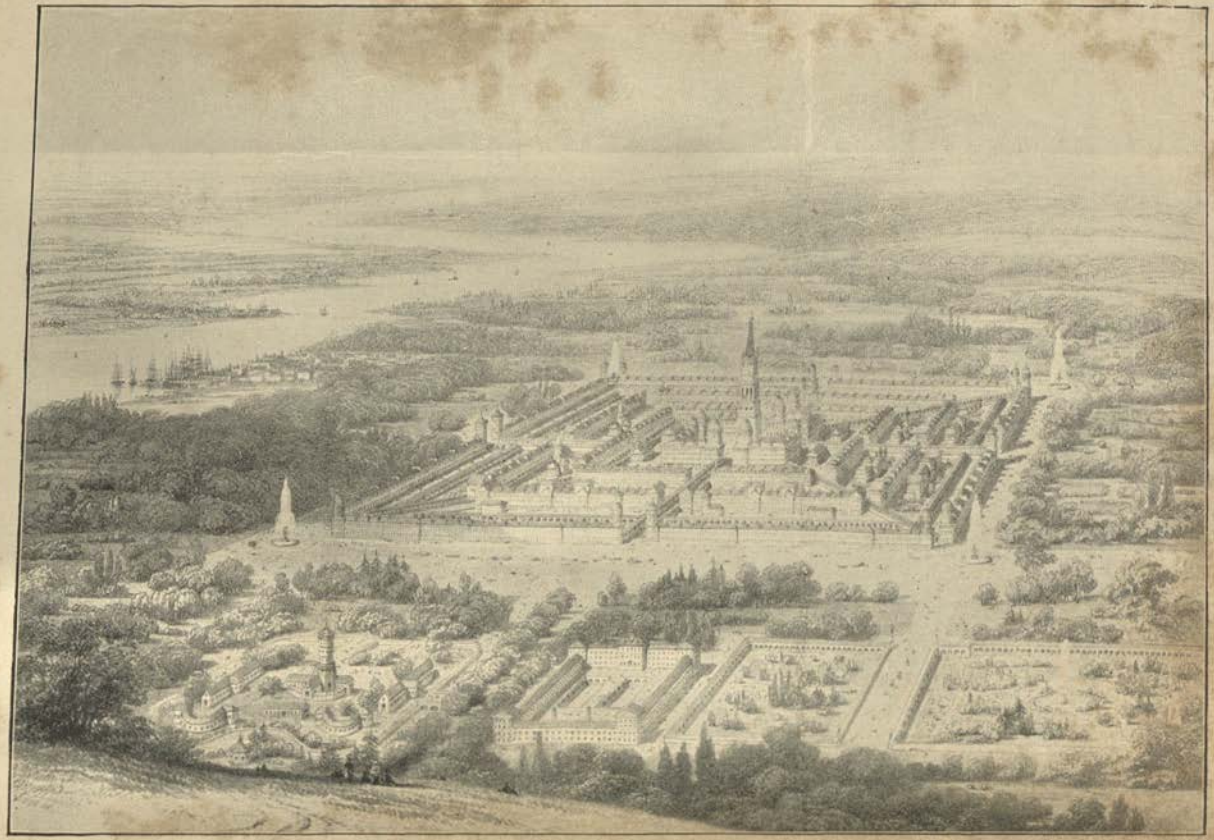
But the buildings they could not bring. Hence exteriorly our dwellings have remained without grace; for surely no one can say that an average British street, with its interminable rows of all-adjoining, flat-faced, dingy brick fronts, unrelieved by a single pleasing feature, is a thing prepollent to elevate the mind.

Happily things are changing rapidly; buildings of every description are fast becoming more artistic, as also their British-made contents—the furniture, the pictures, the wall coverings, and the draperies. There be those, I believe, who, even at this date,

fail to understand the value of science teaching, and deplore its cost. But surely none can observe the artistic tone now insinuating itself into our streets, our shop-fronts, our houses, interiorly as well as exteriorly, without feeling that the money spent upon our Science and Art Department has been *well* spent.

One very important lesson has only recently been learnt: that, given the artistic taste and the opportunity, a house can be made artistic almost as cheaply as it may be made hideous. What applies to interiors applies—though rather less forcibly—to the exteriors. Garden City authorities and their architects, therefore, have it in their power to do two things—to make the cities hideous or to make them beautiful. Which will they do? Commercial instinct will decide, if artistic feeling should be at fault. In these days it would be false economy to build an ugly town. Artistic treatment in this relation would prove the best investment.

I feel that the practical utility of the remarks I venture to make under the heading of this chapter might be enhanced were I to make them directly referable to the actual site purchased for the erection of the 'First Garden City.' This has already been done by a company promoted and brought into being through the persistent efforts and exertions of that most laudatory *coterie* of well-doing individuals—at first a very small but happily determined and ever-increasing band—the 'Garden City



The Ideal City of J. S. Buckingham.

DESCRIPTION OF BUCKINGHAM'S PLAN OF A MODEL TOWN

FOR A

TEMPERANCE COMMUNITY OF ABOUT 10,000 INHABITANTS.

A. Outer Square of 1,000 Houses and Gardens, 20 feet frontage, 100 feet deep.
B. Second Square: Covered Arcade for Workshops, 100 feet wide.
C. Third Square: 560 Houses and Gardens, 28 feet frontage, 130 feet deep.
D. Fourth Square: Covered Arcade for Retail Bazaars, 100 feet wide.
E. Fifth Square: 296 Houses and Gardens, 38 feet frontage, 160 feet deep.
F. Sixth Square: Covered Arcade for Winter Promenade, 100 feet wide.
G. Seventh Square: 120 Houses and Gardens, 54 feet frontage, 200 feet deep.
H. Central Square: 24 Mansions and Gardens, 80 feet frontage, 250 feet deep.
I. 5 Churches or Places of Public Worship, 200 feet by 130.
J. Library below and Gallery of the Fine Arts and Antiquities above.
K. University below and Museum of Natural History above.
Kk. Hall for Public Meetings below, and Concert-Room above.
L. 12 Dining-Halls below, and Drawing-Rooms above, 100 feet by 65.
M. 12 Public Baths below, and Reading-Rooms above, 100 feet by 65.
N. 8 Infant Schools, Gymnasium below, School above, 100 feet by 65.
O. 4 Boys' Schools from 5 to 10 years of age, same division and size.
P. 4 Girls' Schools from 5 to 10 years of age—as above.
R. 4 Boys' Schools from 10 to 15 years of age—the same.
S. 4 Girls' Schools from 10 to 15 years of age—the same.
T. 8 Avenues 100 feet wide in the centre, 20 feet Colonnade each side.
U. 24 Streets 100 feet wide in the centre, and 20 feet Colonnade.
V. 24 Open Grass Lawns for Dining-Halls, Baths, Schools, etc., 150 feet wide.
W. Inner Grass Lawns for Public Edifices, Churches, etc., 300 feet wide.
X. 8 Fountains, 100 feet diameter below, and 50 feet jet.
Y. Inner Square, or Forum, with Porticos and Public Offices, 700 feet square.
Z. Central Tower for Electric Light, Clock, and Gallery, 300 feet high.

(*For reference letters see plan, page* 126 *A.*)

Association.' I will therefore follow this course, but before entering upon it, I feel it will entertain the reader if I present, in the actual words of the talented author and pioneer to whom I have already had occasion to refer—James S. Buckingham—a description of the interestingly comprehensive plan of a city for a community—most thoughtfully to consist of all grades—of 10,000 inhabitants:

'The objects chiefly kept in view,' he goes on, 'have been to unite the greatest degree of order, symmetry, space, and healthfulness, in the largest supply of air and light, and in the most perfect system of drainage, with the comfort and convenience of all classes; the due proportion of accommodation to the probable numbers and circumstances of various ranks; ready accessibility to all parts of the town, under continuous shelter from sun and rain when necessary; with the disposition of the public buildings in such localities as to make them easy of approach from all quarters, and surrounded with space for numerous avenues of entrance and exit; and, in addition to all these, a large intermixture of grass lawn, garden ground, and flowers, and an abundant supply of water—the whole to be united with as much elegance and economy as may be found practicable.

'Plans of greater variety in architectural elegance might easily have been produced, but these it is thought proper to reserve for future Towns, when the certainty of large profits from this shall be established, and when more exuberant and more costly ornament may be justly introduced. In this, simplicity, convenience, and economy are the chief considerations, though ornament has not been neglected.'

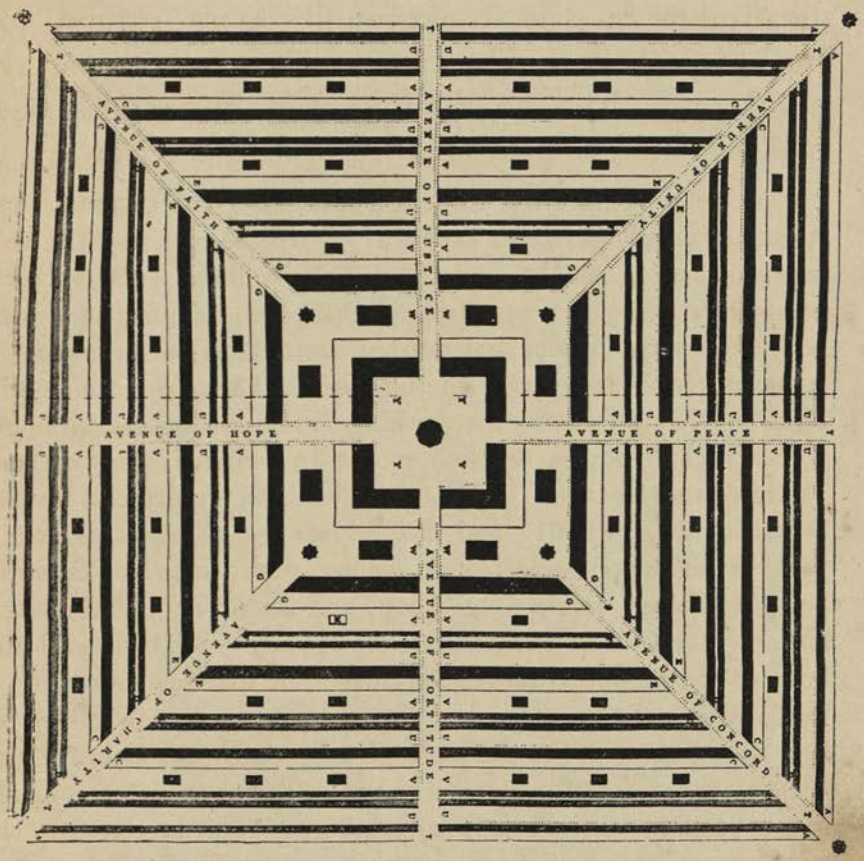
For various reasons Mr. Buckingham did not mention the *locale* he had in his mind's eye for his ideal City. Carefully scanning the view of it he drew

at an advanced age, and whilst sojourning in the Kyles of Bute, will show us that it was intended to be near the outfall of a river of some size, which, in its sinuosity, might well be dear old Father Thames, were it not for a range of mountainous hills just discernible in the background, more natural to Rothesay than to Sheerness. To grasp the many novel propositions and suggested innovations, the reader should compare the view with the plan.

'1. Commencing from the outer margin of the square, which is exactly a mile in extent each way, it will be seen that the first range of buildings (A) contains 1,000 dwellings—250 on each side—each house having 20 feet frontage and 60 feet of depth, with 60 feet of ornamental garden ground on one front and a colonnade of 20 feet broad on the other. These are intended to form the habitations of the working classes, being let in single rooms to single men, in two rooms to married men without children, and in three rooms to families with children, at annual rentals of £5, £10, £15, and £20 a year for portions, or £30 a year of rental for a complete house, each separate premises being furnished with a water-closet, and ample supply of water, air, and light. The garden is to be equally available to all the inmates of the same dwelling for cultivation and recreation.

'2. Along the inner front of this outer square—subdivided as it is into eight right-angled triangles by the intersection of the eight principal avenues of entrance to the Town—runs a colonnade of the light Gothic order, sustaining a roof level with the windows of the first floor, forming a continuous balcony of 20 feet wide, serving for an open promenade in fine weather, and covering the same space below of 20 feet wide, with a flagstone pavement, for promenade in rain, or under shelter from the rays of the sun.

'3. From this outer square to the next range of buildings is an open street (U) of 100 feet in breadth.



Plan of Buckingham's City.

'4. The next line (B) is a continuous covered gallery or arcade, 100 feet wide—like the Burlington and Lowther Arcades in London—the central way through it being 20 feet in breadth, having on each side workshops of 40 feet depth, with frontages varying according to the space required—from 20 feet to 50 feet each. These would be one story in height, with windows on both sides, the roofs of the workshops being flat, to form an open promenade, and the central passage being lighted from the top with glass, as the Arcades referred to. In these workshops, which would thus be in immediate proximity to the dwellings of the workmen and their families, no kind of labour would be carried on which would be in its nature offensive to the inhabitants—all such being removed to some distance from the Town—such as steam-worked factories, slaughter-houses, chemical works, forges and furnaces, glassworks, etc.

'5. From these covered galleries to the next row of dwellings is an open space (V), covered by a grass lawn, of 150 feet in breadth; and in each of these lawns are placed the public edifices —making forty-eight in all—of 100 feet by 50 feet each, with two stories, completely isolated from connection with all other buildings, in order to insure perfect ventilation, with numerous avenues of ingress and egress. These would form the dining-halls or Restaurants (L), with kitchens on the area floor, dining-rooms on the ground floor, and drawing-rooms on the upper floor; also the Public Baths (M) in two stories, the baths below and reading-rooms above; infant schools (N) for children of both sexes from three to five years of age, having a gymnasium on the ground floor and the school on the upper floor—under care of their parents or proper nurses, and teachers trained to, and fitted for, that duty; with schools for boys from five to ten years of age (O), and schools for girls within the same periods (P) —each on two stories, and fitted with every requisite for health, order, and instruction.

'6. Next in order after these, advancing always towards the centre, is the third square (C), consisting of dwellings of a larger size—of which each side of the square contains 140 separate

houses, or 560 dwellings in all, each of 28 feet frontage, 56 feet deep, and with 74 feet of garden ground in front. These would form the habitations of the class in advance of the labourers and artisans—superintendents of the different departments of labour, and persons in charge of the several stores for the distribution and supply of all the articles required for the use of the Town. These might be divided into floors or suites of apartments, or occupied entirely by one family, as their numbers and means would require and admit, realizing an average rental of £60 per annum, being furnished with every domestic convenience in the most improved form.

'7. In front of this row of dwellings is a colonnade of the *Gothic* order, supporting a roof, serving as a balcony or open promenade, as the former one, and covering, in like manner, a paved way beneath of 20 feet wide.

'8. From hence to the next row of buildings is an open street (U) of 100 feet in breadth, measured from the outer edge of the colonnade, and exclusive of the covered way.

'9. The next row of buildings (D) is a second covered gallery or Arcade, forming the Bazaar for the Stores or shops of all kinds, in which the various articles made in and around the Town, or imported from without, are exposed for exhibition and supply to all who need them. The arrangement of these would be also in shops of different extent of frontage, according to the requirements of each case, but all of the uniform depth of 40 feet each, lighted on both sides with a central passage of 20 feet broad, lighted from above, making 100 feet of breadth in the whole. The shops would be covered with a flat roof above for open promenade, as over the first gallery described.

'10. From hence to the next range of dwellings is an open space (V), covered with a grass lawn, for other Public Edifices, including a Dining-Hall, or Restaurant, and Drawing-Room above (L), a Public Bath and Reading-Room above (M), a School for Male Youths from ten to fifteen years of age (R), and a School for Female Youths within the same periods (S).

'11. Next in order is the Fifth Square of buildings (E), of

which there are 74 dwelling-houses on each side of the Square, or 296 in all, each of 38 feet frontage, 76 feet in depth, and with 84 feet of garden ground in front. These will form the residences of the professional classes, or of persons of independent and moderate income, desirous of living within the Town, as share-holders or capitalists, without joining in any of its labours, and may be either divided between two single individuals or small families, or occupied entirely, as may be most convenient, realizing, on the average, a rental of £125 per annum.

'12. In front of this Square is a colonnade of the Ionic order, sustaining a roof or balcony for open promenade, and covering a flag-paved way of 20 feet breadth below for shelter from rain and sun.

'13. From this to the next row of buildings is an open street (U), of 100 feet broad, from the edge of the colonnade, and exclusive of the covered way.

'14. The sixth row of buildings (F) is a Covered Gallery of 100 feet in clear breadth, for the Public Promenade, to be adorned as time and improved wealth may admit—as the Porticos of the Romans and the Agora of the Greeks—with pictures and statuary; and on every evening to have a Band, formed of the musicians of the town, to be open as a Public Promenade to all classes—sheltering them from rain, snow, or sun, and enabling the youngest and most delicate to take walking exercise for health and pleasure at all hours and on every day in the year.

'15. Next follows an open space of grass lawn (V) 150 feet broad, with a Dining-Hall, or Restaurant, and Drawing-Room above (L), and a Public Bath, with Reading-Room above (M); these diminishing in number, but increasing in elegance, as they approach the centre of the Town, among the residences of the richer inhabitants, for whose use they are chiefly intended.

'16. After this comes the seventh row of dwellings (G), of a larger and more elegant style than the former. Of these there are only 30 on each side of the Square, or 120 in all, each having 54 feet frontage, 100 feet of depth, and 100 feet of garden ground in front, and producing, on the average, a rental of £200 a year,

for the occupation of the superior ranks of professional persons and wealthy capitalists and their families.

'17. In front of this row of dwellings is a colonnade of the Corinthian order, with flat roof and balcony above and covered way below, as in all the others, and of the same width of 20 feet.

'18. Within this is the Grand Outer Square, planted with trees, lawn, and flower-garden in front, of 300 feet breadth (W), in which are placed the chief Public Edifices requiring to be near the centre of the Town, and equally accessible to all its inhabitants —namely, five Churches or places of public worship (I), 200 feet long by 130 feet broad, open to the appropriation of such groups of the inhabitants as may desire to use them for public worship, under the ministry of pastors of their own choice, and maintained at their own expense; the Museum and Gallery of Fine Arts (J), constructed expressly for these objects, with all the proper adaptations of space, light, and ventilation (K); the Public Hall, for Meetings and Lectures below, with Music-Hall or Concert-Room above (Kk); the University for Professional Education, and the cultivation of the particular faculties which may be strongly developed in any of the pupils of the schools, with the Public Library above—all these edifices being of nearly similar dimensions, but each in the style of architecture best uniting convenience with elegance.

'19. The last ranges of buildings are those forming the Grand Inner Square (H), on each side of which are six mansions, or twenty-four in all, each having a frontage of 80 feet, a depth of 150 feet, and 150 feet of garden ground in front, for the residences of the members of the Government and the more opulent capitalists, and realizing an average rental of £300 a year each.

'20. Around this Grand Inner Square (Y) runs a colonnade of the *Composite* order, similar to all the others in design, and of the increased dimensions of 23 feet each, also growing more lofty and more elegant as they advance through the several gradations of the Gothic, the Doric, the Ionic, the Corinthian, and the Composite orders of architecture.

'In this Central Square would be concentrated all the Public

Offices required to be rendered as accessible as possible to all; namely, the Court of Arbitration for the administration of Justice—the Treasury—the Bank—the Council Chamber—the Post-Office—and such other Municipal Establishments as might be found necessary. These would be all on the ground floors of the several edifices here placed; while the upper portions—from the first floor inclusive—would form the residences of the Governor, the Members of the Council, or the Ministers or Heads of Departments, as in the Palaces of Italy, the Hotels of the Ministers in France, and most other of the European countries.

'The open space within this (Y), 700 feet square, would form the chief place of public assembling in the open air in fine weather—like the Forum of the Romans or the Agora of the Greeks—and might be adorned, as time and means would admit, with great architectural elegance.

'At the angles of the four Avenues leading diagonally into the Central Square are four Fountains (X), intended to be 100 feet in diameter, with 50 feet jet of water; and at the opposite extremities of those avenues will be four corresponding Fountains —making eight in all—though want of space in the margin prevented their being represented in the Ground Plan.

'In the centre of the whole is an Octagonal Tower (Z), of 100 feet diameter at the base, to be crowned with a spire of 300 feet elevation, and to contain an Electric Light for lighting the whole Town, a large illuminated clock, the bells for public worship and other occasions, with apartments in each stage, and galleries leading from them around the Tower for the enjoyment of the air and view.

'As it has been thought desirable to accompany this Ground Plan of the Model Town with a Perspective Elevation, taken at a bird's-eye view so as to give an idea of the character and appearance which such a Town would present when built, an attempt has been made to embody the chief features of its form and subdivisions—omitting some portions for the purpose of preventing too much crowding in the rest. The difficulty of doing this as well as could be desired arises from the smallness of

the scale on which it is necessary to make the Drawing, in order to leave space for the surrounding and suburban accessories, such as the Cemetery, a Manufactory, Abbatoirs, Public Gardens—which it is material to keep in mind are all intended to be at a short distance from the Town; and the proximity of a river and the sea are objects much to be desired for the advantages which both offer to those who dwell upon their margin—while any extent of architectural elegance and rural beauty, whether of Nature or Art, or both combined, might be commanded in the environs of the Town itself.

'It will be perceived that by this arrangement the following advantages, few or none of which are enjoyed by the present system of building Towns, will be here united:

'The ample breadth of all the Avenues (T), the names given to the eight grand openings of approach to the centre of the Town, as well as of the thirty-two streets (U)—the names confined to the lateral passages—in front of each of the rows of dwellings, each being 100 feet in clear central width, with a colonnade or covered sideway of 20 feet broad to each, and the thirty-two open lawns (V and W), of 150 and 300 feet broad, in which the Public Buildings are placed—will secure the most perfect ventilation and the greatest degree of cleanliness in every part.

'The covered arcades appropriated to the workshops and bazaars or stores on each side, and the Covered Gallery for Public Promenade, having a well-paved and well-lighted passage in the centre of each, and leading at each end into colonnades of the same dimensions, will afford the power of going from every dwelling, workshop, or store, to the remotest part of the town, all the way under cover, completely sheltered from rain, wind, snow, dust, or sun, for want of which convenience social visits, and even the duties of business, as well as those of health and devotion, are constantly obstructed; and the other inconveniences, either of expensive conveyances to those who must ride, or of colds taken by exposure to rain and mud by those who can only afford to walk, are felt by different classes; while persons of

delicate constitutions and children, for want of such shelter, are deprived of the opportunity of that daily exercise which is so essential to the growth of a vigorous constitution.

"From the entire absence of all wynds, courts, and blind alleys, or culs-de-sac, there would be no secret and obscure haunts for the retirement of the filthy and the immoral from the public eye, and for the indulgence of that morose defiance of public decency which such secret haunts generate in their inhabitants.

'There being neither beer-shops, gin-palaces, dram-shops, cigar divans, pawnbrokers, gambling-houses, nor brothels permitted, or possible to be established without immediate detection and suppression, in any part of the Town, the host of evils thus avoided may be more easily imagined than described.

'The arrangement of the buildings in concentric Squares places the residences of the working classes nearest the green fields on the immediate edge of the Town, which is favourable to their health, and, being close to their workshops, is also favourable to the economy of their time and labour; while, as the greater number of the inhabitants will be formed of that class, their dwellings are by this arrangement more numerous, and on a more moderate scale of size than would be compatible with their occupying any of the inner Squares nearer the centre.

'The positions of the succeeding ranges of dwellings are in conformity with the principle of progressively increasing size and elegance, and progressively decreasing numbers, each class becoming fewer in the number of the individuals composing it as they rise in the possession of means, or of qualification for higher duties and more responsible offices.

'The arrangement of the Public Edifices is adapted to the general convenience—the most important being placed in the very centre of the whole, and the others so equally divided in each quarter of the Town as that the number of the Dining-Halls and Drawing-Rooms, Public Baths and Reading-Rooms, Schools, etc., is greatest where the population is most numerous, and goes on gradually diminishing towards the centre, where they become least so.

'By the roofs of all the colonnades, and of all the terraces, or rows of dwellings, and other buildings, being made flat, instead of angular or pent-roofed (the former being invariably the custom in every part of the Oriental world, and found to be as perfect a protection against rain or snow as the steep-sloping roofs of the European countries), ample space for promenade will be accessible from every part without even descending into the streets, which in the early hours of the morning or in the evening twilight is often most convenient, when a distant walk might be impracticable.

'It should be observed that, as all the buildings would be constructed of iron, both their fronts and sides would be equally handsome, and not present the discrepancy and deformity of modern towns generally, in which stone or stuccoed fronts are contrasted with the brick backs of the houses, and the roughness and meanness of the one made the more visible by comparison with the other.

'It will be seen also that, as the Squares of the Town consist of eight triangular sections, each of which preserves the same proportion of private and public buildings, the construction might be so proceeded with as to complete the whole in a very short time by separate groups being employed on each of these sections at the same time.

'At the principal crossings of the streets and avenues light triumphal arches would be raised, through the central openings of which carriages could pass, with sideways for foot-passengers; and while the roofs of these would be in continuation of the balconies above the colonnades, the transit below would be a continuation of the colonnades themselves, and thus enable all persons to cross the streets above or below as the state of the weather would render most desirable.

'N.B.—All large Manufactories using Steam-Engines would be removed at least half a mile beyond the Town, as well as Abbatoirs, or Slaughtering-Houses, Cattle Markets, Reservoirs of Sewerage for Manure, the Public Cemetery, Hospital, Botanic Garden, Cricket-Ground, etc., and on the land to be attached to

the Town for Agricultural and Horticultural operations. Sites would be reserved for the building of Suburban Villas by such residents as might desire it.'

Although, as I trust, the reader may have been entertained by the foregoing description of a city in which 'simplicity, convenience, and economy' were the chief considerations, it may come as a relief when I add that I am unable to present to him also the 'plans of greater variety in architectural elegance' Buckingham 'thought proper to reserve for future towns.' I cannot, however, refrain from adding my fervent hope that the First Garden City *shall* 'establish the certainty of large profits,' and that they *may* be the means of justly introducing 'more exuberant and more costly ornament.'

The reader has now had before him the circular suggestion of Howard and the rectangular proposal of Buckingham. I will now proceed—with due humility and submission—to describe a plan of my own proposal, in conformity with the view that things in this world can usually be best obtained by judicious compromise, my object being to effect a compromise between the idiosyncrasies and extravagances of both and the state of things to-day existent in our ordinary towns.

I am obliged, from the convictions I have already touched upon, to draw up my plan upon the rectangular principle. In doing so, I omit from it the diagonal thoroughfares—this with all deference to the great master, Sir Christopher Wren, as well as

to Sir John Evelyn and L'Enfant. Not because I fail to thoroughly appreciate their teachings, but because the conditions obtaining are *not* analogous. In both instances the projectors had to deal with land upon which there was no restriction as to density of population. Sir Christopher knew his Corporation, and that the land was very valuable. He knew also that streets of abnormal width were inadmissible, by reason of the restricted area; he knew, furthermore, that it were useless to endeavour to enforce any restriction as to the height of buildings. It was the practice of the time to have hugely 'overhanging' fronts, and he had in his mind, as the predominant factors, facility of locomotion, architectural effect, and efficient ventilation.

Obviously, diagonal streets, *if carried entirely from corner to corner of a city*, increase the efficiency of ventilation by providing four avenues, which would be of maximum efficiency with the wind blowing in directions otherwise than *normal* to the four sides of the City. But this increase of efficiency only occurs if the streets running parallel to such sides *are also continued from side to side of a city.** This point being both interesting and important in regard to densely populated towns, but not so much so in regard to Garden Cities, I will explain it more fully by the aid of diagrams in the Appendix to this chapter. Suffice it here to remind readers that the

* It will be observed that Buckingham's plan did not provide for this.

arguments concerning street ventilation, applicable to towns composed of streets of continuous houses, cannot, by reason of their nature, be made to apply to Garden Cities, the essence of which is that they shall be Cities of Gardens.

Again, L'Enfant, in his 'City of Magnificent Distances,' had to consider more especially facility of getting from corner to corner, whereas in Garden City, having sides about a mile in length, the maximum distance along a diagonal is a mile and three-quarters, or little over three-quarters of a mile from the centre to either of the extreme corners. This aspect of the matter has therefore little import as bearing upon our subject. No one knew better than Sir Christopher the great structural inconveniences that would arise from the diagonals, but, under the conditions with which he had to deal, he was prepared to sacrifice these for sanitary improvement, and compliance with former order. There is, however, no reason why one should introduce architectural and locomotive inconvenience into a Garden City upon this head.

In entering upon a proposal for a plan of a Garden City, one has to be led wholly by two factors: firstly, the purposes the City is eventually to fulfil, viz., when fully consummated; and, secondly, the best and most judicious mode of dealing with the attributes of the actual site.

As to the first, these may be subdivided into (*a*) the provision of a certain number of dwellings for

housing two distinct classes of the community; (*b*) the provision of a certain number of *private spaces* or gardens, properly proportioned to and allowed to each; (*c*) the provision of *appropriate thoroughfares* — avenues, roads, streets, and easements — properly proportioned to the requirements of each; (*d*) the provision of suitable *public spaces* appropriate to the use and convenience of each; (*e*) the provision of suitable *shops* and *emporia* appropriately suited to the purses and needs of each; and, lastly, (*f*) the provision of apposite *recreation* to suit their respective tastes.

With regard to *a*, *b*, *e*, and *f*, these will be found dealt with in other chapters (principally in Chapter IV.); *c* and *d* shall therefore be considered here.

With these premises, I will, with the reader's kindly concurrence, build up my proposal with units proportional in size to their importance. Deeming the artisan of such importance that I devote a considerable portion of another chapter to his village, I may *perhaps* be *allowed* to say a few words in regard to the laying-out of the City for the *joint* enjoyment of himself and others to whom he will be principally indebted for its realization.

I would, therefore, first plead that the private resident might be provided, jointly with the artisan, with a place 'whereon to place the soles of his feet' in the form of a centrally-situated promenade and public gardens, forming part and parcel therewith. With fear and trembling, I beg to direct the reader's

attention—for I presumably have not the honour of his acquaintance—to such a promenade shown upon the plan, representing a small public acreage in Hertfordshire, upon which a capitalist and even a landlord may yet be allowed to walk. This, I may point out, runs from south to north (few points west). Before proceeding upwards to the *paradiso* in the upper regions—the 'capitol gardens' in which the richer man will be allowed to promenade as well as the poorer—I think it would be advisable to briefly describe the spot and, as briefly, set out the ultimate scope of the City to be implaced thereon.

The land upon which the First Garden City is to be built is due north of London, in Hertfordshire. It is about 4,000 acres in extent, and lies north and south of the Great Northern Railway running from Hitchin to Cambridge, being distant from the former town about two and a half miles, and from the latter about twenty-two miles. The land constitutes a portion of the north-west corner of the county adjoining Bedfordshire, the capital town of that county, as of its own, being within fifteen miles. It extends, on its westerly side, to the little old-time town of Baldock, famous alike for the great width of its church and its Main Street, the latter forming a portion of '*The Great North Road*' connecting London with York. This to-day is one of the most popular 'motoring' roads; the days were when it was one of the busiest of mail-coaching roads. Indeed, the great breadth of the Main

Street is traceable to the exigences of coaching times. Motorists have this fact frequently brought to their minds when upon the routes of the old-time coaches, for although nowadays only a portion of the centre continues to be utilized, we have in the open country the hedges demarking the original width of the coaching highways, which, we see, were about *three times* the width of the present—so much less used—roads. Happily, in many cases, the cottages, houses, and hostelries had their frontage-line lineable with these wider boundaries, and that fact has given us the bold, broad high streets of some of our small towns, of which Baldock is an example.

Long, however, before the post-horn was heard heralding the galloping four, a road of communication—and a fine one—passed through Baldock and skirted the Garden City Estate. I refer to the Roman road *Erming* Street. This ran from London, in a very direct line, through Braughing near by, on to Lincoln, and thence to the banks of the Humber. Here the Roman warriors must needs have occupied themselves in a little navigation to the opposite banks, from which the 'strete' continued to York (Eboracum). The *locale* is also traversed in a south-westerly to north-easterly direction by the '*Icknield Way*'—called in the Laws of Edward 'Hickenield Strete.'*

The soil of the site is varied as to density, its substratum, chalk, also varying greatly as to its

* See Locomotion, Chapter VII.

depth below the surface; at points it outcrops, at others a foot or so of soil intervenes, whilst at others the surface soil is deep. Its area is cultivated about equally, arable and pasture. To the north of the railway is a large coppice and spinny, which I suggest should be utilized as the village park, whilst nearer its southern boundary it is partially wooded, and in that portion there are some fine elm-trees. It boasts several very pretty villages and churches, and is watered by a small river called the *Ivel*. It consists of a central plateau with an undulating fringe.

In regard to the building of the City, I have assumed the following:

(*a*) The rectangular form of laying out.

(*b*) The passenger railway-station shall be situated at approximately the centre of the estate, and shall abut upon both the City and the village.

(*c*) The City proper shall cover about 822 acres.

(*d*) The City proper, together with its suburban residences, shall be situated to the south of the railway intersecting the estate.

(*e*) The City and such residences shall be surrounded by an agricultural margin.

(*f*) The Garden Village, consisting of the cottages of the artisans, factory hands, and agricultural labourers, the homes for female operatives, the crèche, men's recreation-rooms, clubs, and schools, shall be situated immediately north of the railway, and bounded on the west and north by the industrial

zone, and east and south by the people's park. The hostels, clubs, institutes, and schools to be situated immediately upon the margin of the park, in order that it may be enjoyed therefrom, and effect economy in regard to the schools by its being utilized as playgrounds for them.

(*g*) The agricultural zone to be so placed that any emanations from it—from the gasworks, sewage farm, and the like—should be blown away from the City by the prevailing wind.

(*h*) Eastwards of the people's park and also of the City proper would be agricultural land, representing in one undivided tract about one-half of the estate, upon which practically no capital expenditure would have to be provided for.

The considerations which have principally influenced me have been: Firstly, the lie of the land and the general direction of existing roads; secondly, the closest approximation possible, though with absolute separation of the residential City and the industrial zone and its dwellings; thirdly, the keeping down to as low a figure as possible the great expense which will have to be faced—of the laying of the requisite mains for electricity, gas, and water, and the culverts for surface-water and sewage drainage—in which connection the approximation of the industrial zone to the City proper without injuring the latter are matters of great importance.

This disposition of the respective parts of the whole is indicated in the diagram, the respective

areas being approximately City proper 822 acres; Village 478 acres; Industrial Zone 50 acres; Agricultural Girdle 2,450 acres.

From the 'lie of the land' it is obvious that the proper position for the centre of the City is the middle of the plateau to which I have referred, and which may be taken as lying within the dotted line. From careful consideration of the varying depths of the railway cutting I have fixed the line A B as being the most appropriate for the centre line of the City, and along this line—in accordance with my view that, with a given expenditure, the City could be made most imposing by means of straight thoroughfares—I will proceed to set out its *Grand Promenade.*

The problem of utilizing this appropriate plateau is not exactly a simple one, because one has ever to bear in mind the paramount importance of the City being, as far as possible, self-supporting from the increment in its terrestrial value alone. Financial considerations, therefore—as is almost always the case in things mundane—largely govern the situation, and obviously, from this aspect, the thing to do would be to pack the land as closely as possible with revenue-returning plots. But this would neither be setting the example nor tending to attain the object desired. There must therefore be the spirit of compromise—which I contend must run through all Garden City considerations—bringing about the blending of financial prudence with broadness of view, or in this case broadness of avenues.

Taking the 'City of Magnificent Distances' as my standard, and thus deeming the suggestion of Mr. Howard as at least twice too liberal and lavish, I will proceed to plot out this central portion of the new City. From the outset, it is clear, we cannot proportion the width of the 'Grand Promenade' to the traffic, because in that case it would work out with a meagreness in architectural aspect none would desire. Indeed, if we reflect we shall find that it usually obtains in existing cities that the 'show' thoroughfare, as it were, is that most disproportionate to its traffic-bearing capacity. Paris might well be cited as an exception, but for this an adequate reason can be ascribed. For a careful survey of the environs of the French capital will serve to show that—unlike London and many others—it possesses, really, only one 'pretty' side. Hence it has come about that the 'show' avenue of the Parisians is really at the same time the most crowded with traffic—of one class. London is more fortunate; for it is bounded on no less than *three* sides with beautiful environs; yet, strangely enough, it does not possess, in regard to either of these three sides, a thoroughfare at all appropriate, uniformly continuous, or capable of dealing, in anything like an adequate manner, with the mass of personal and material transport with which the existing sinuous and disjointed means of exit and entry are incessantly congested.

In considering the *Grand Promenade* of Garden

City, it is obvious that if, to produce a noble architectural effect, recourse is had to a bold 'carriage-way,' this would be a very uneconomical mode of attaining the end. My proposal, therefore, is that, instead of a broad and costly carriage-way, *two*, of width amply proportioned, and suitably paved in accord with traffic requirements, should be provided, and that the increase of breadth required for architectural effect should be obtained in a more economical—at the same time more ornamental—manner by the provision of a central, grass-margined promenade.

I have endeavoured to show (see Locomotion) that large sums of money may be absolutely wasted in the broadness of roads, by making them of such widths that they are unnecessarily wide for a certain amount of *carrying capacity per unit of time*, and yet not wide enough for a greater capacity which they can *almost*, but *not quite*, grapple with. The capital expenditure upon such roads is also greatly —and uselessly—increased when the traffic upon them travels in both directions. I have it, therefore, in mind, that in *Grand Promenade* the traffic should proceed in *one direction only* on each of its carriage-ways. This arrangement is redolent of conveniences, both vehicular and pedestrian, as well as public safety. On this assumption I feel that expenditure upon a carriage-way exceeding 20 feet in width—allowing *ample* room for the rapid passing of carriages whilst vehicleswere at rest at the curb-edge—would be wasteful expenditure.

With regard to footways, the greatest impediments to pedestrian locomotion are shops. The 'blocks' arising from the assemblage of stationary individuals cause the moving stream to be forced out towards the curb. Hence that width of footway proportional to foot traffic in thoroughfares of private houses is disproportionate and inadequate in thoroughfares where 'shopping' takes place.

It will therefore be seen that to obtain boldness by means of increase of width, due to unnecessarily wide footways, would again constitute ill-expended capital. Moreover, in connection with my suggestion of a bold—centrally situated—promenade in the best part of the town, forming part and parcel of the public and botanical gardens, it is fair to assume that in fine weather the 'sideways' would be deserted in favour of the broad gravelled, verdure-edged and flower-margined walk where the inhabitants would 'take the air and meet their friends.' On the other hand, if the less expensive gravel walks were provided for the sidewalks, the trade pedestrian traffic, which *must* be carried on in bad weather as in fine, would result in its being 'cut up,' and thus entail unsightliness with expense. In this relation, it might easily be arranged—by the provision of a few handsome polished granite bollards and ornamental chains—that the custodian of the promenade should prevent its use whenever the ground was at all soft; by this means its surface might be preserved in fine condition at the minimum of expense.

Such a disposition and mode of constructing the thoroughfare would, I contend, whilst providing a *stately avenue*, enable this to be carried out at less than *half the expense** the ordinary mode would entail. It would, moreover, be 'a thing of beauty' —a place of pleasurable resort—instead of a wholly utilitarian thoroughfare. Concurrently with it, also, would be a further great saving, both of money and land area; because, in my opinion, it would be quite unnecessary to lay out and maintain an expensive park, with costly roads, fountains, lakes, and the other usual '*attractions*.' For surely such a pleasance as these avenue gardens would constitute, centrally situated and, so to speak, at the very doors of the inhabitants—in conjunction with a small 'botanical gardens,' intended more or less for study—would provide all the rate-rent-paying inhabitants would reasonably ask. *The People's Park* —an undulating copse and bracken-covered series of ingles, in which the less Nature is tampered with the better, and where, by reason of the existence of a streamlet, pretty and serpentine lakelets could be formed at the minimum of expense—would provide for—in a thoroughly adequate manner—the requirements of the operatives, and this in the position most advantageous to them—namely, close to *their* own doors. Money would not be so well spent in parks as in beautiful thoroughfares; for the latter would be seen and appreciated *daily* by those who

* See Calculations anent this.

would bear the expense of their maintenance, whereas it is well-known that parks are more used by sight-seers who come from a distance than by the inhabitants themselves, whose visits to *their own* parks resolve themselves into but a few in the course of the whole year.

Grand Promenade.

The reader has been so courteous as to accompany me as far as the foot of *Grand Promenade*, and we are now at the point marked * in fancy, but at the point also marked † (on the plan) in fact—this, as will be seen, being in actuality a spot upon the existing road joining Hitchin to Baldock, about 560 yards east of the lane leading up from Willian. At this point is presented to us the most imposing vista in the City,* for our line of vision carries us through the whole length of the Grand Promenade, at the end of which we see, uprearing itself in appropriate architectural proportion, the '*Capitol*.' We are standing in the centre of one of the several 'avenue gardens' which constitute a feature of the City, from whence, if we turn about, we see the *Botanical gardens* sloping away to the south. The lengthy promenade (about 1¼ miles in length [2,100 yards]) is prevented from becoming monotonous by being broken up, in pretty manner, by the interposition of another and

* The grandeur of the view would not be increased by our going farther south, on account of the fall in the ground towards Willian.

larger 'garden circus' at the intersection of the *Grand Promenade* with the *Central* Avenue.

There is nothing appreciated more highly by the town-dweller than the fresh green of the grass. 'What do we not owe to grass alone in the painting of Nature! Happy dwellers in the verdant country-side—those who can gaze upon the emerald of spring, the green velvet of summer, the bronze plush of autumn— you can scarce be trusted to reply. But let your vocation enchain you within the demesne of the smoke fiend, the too well defined *ceinture* of commerce, where all is colourless and sable, or within the workshop of Vulcan, the "Black Country"; spend you your days in the embowelling of the earth for the blackened verdure of past ages, the smelting of her iron-veined rocks, scorched by streams of molten metal instead of by the joyous beams of an absent sun, hidden behind a funereal pall of sulphurous smoke—then as you emerge upon Nature, virgin and unseared, may you appreciate the value of grass.'*

All this may be as true as it is pretty; but the question of expense in maintenance is ever present in the mind of the engineer. Fortunately, in the case of grass *versus* road, economy is with us. If the roads be paved, kept as narrow as is consistent with convenience, and washed automatically by the system I advocate, the cost of their upkeep will certainly be reduced to the minimum. The grass

* 'Across the Great St. Bernard,' by the Author.

margins will not be expensive in upkeep; but this item will be largely dependent upon the *shape* of the grass plots. The straighter, the more regular, and more level these lawns are, the less will be the cost of labour upon them; because, if this be carefully kept in mind, an electric or petrol* lawn-mower can be used, and the mowing done very quickly and economically. In the laying-out of garden beds, the British gardener seldom exhibits the exquisite taste of the continental floriculturist, and hence we do not see in our own country such exquisitely shaped flower-beds as one does, for example, at Monte Carlo. It is to be hoped that Garden City students will remedy this; but in doing so care should be taken to work in with motor-mowing by giving the flower-beds such shapes that the irregularities of their contour can quickly be run over with a small hand-machine, the heavy work being delegated to electricity.

In walking up this noble promenade, we observe that its stateliness is somehow enhanced by some unusual method, for it is in reality not so *very* wide, after all. It hardly exceeds, for example, Regent Street, and is not so wide as Portland Place. It is

* Petrol lawn-mowers have already effected great economy in connection with parks, cricket-fields, and other large areas of grass. They are, however, more complicated than electric mowers; and hence, seeing that Garden City will supply its own electricity, and that the additional weight of the accumulators is an advantage in rolling the grass, the latter type would appear the more suitable.

but a quarter of the width of the 'Grand' Avenue proposed by Mr. Howard.

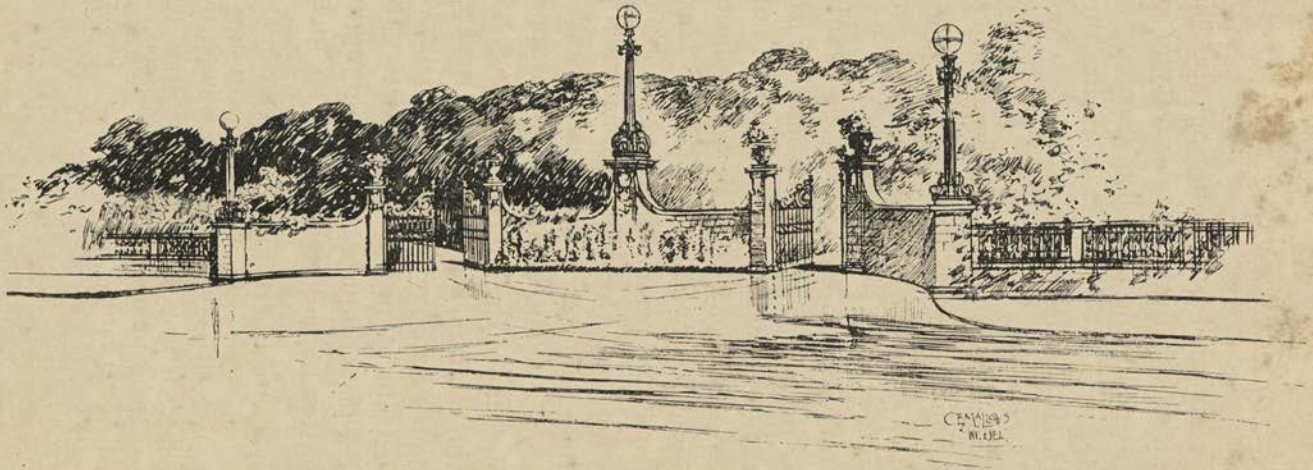
Careful observation shows that the boldness obtained from moderate width is largely due to the fact that—if one may use a Hibernianism—the 'back' gardens are 'in front.' Yet there are kitchen-gardens, but we cannot see them, which is an advantage, the means of its accomplishment being explained later. In addition to this, however, there would appear to be something new about the thoroughfare, imparting to it an entirely novel, bold, and pleasing appearance. Observation shows us it is due to the fact that the lengthy and ofttimes hideous walls with which it is the practice to embellish (*sic*) our thoroughfares—straight, flat, and of monotonous regularity both in style and height—are happily very conspicuous by their absence, being replaced by an entirely new method of treatment, both in regard to themselves and the gates which swing upon them.*

The sketches will, I trust, serve to explain the innovation. In the first place, there are only *half* the usual number of gateways, which in itself is a great convenience and assistance to cleanliness, for the footwalks are only broken up at *half* the number of points by the entrance-roads serving the houses, upon which the mud—carried thither by the

* In some Canadian and American towns the houses stand upon the margins of publicly maintained gardens, without any wall, fences, or other means of demarcation.

wheels of vehicles entering the carriage sweeps—accumulates, and has to be removed. The pleasure of walking upon these footways is marred by the constant necessity of stepping down into and up from these entry pavements, which with the usual mode of road-construction must necessarily be below the general level of the foot-pavement. By the employment of the 'invert' system of road-construction I elsewhere advocate, this necessity of continuously descending and ascending, far from pleasant, is reduced to a minimum — indeed, obviated entirely as to the centre portion of the footway. This becomes practicable through the circumstance that, seeing there are no gutters of mud and water to be stepped over in crossing the roadway, it is not necessary to provide the usual height of curb—a point which will be appreciated by elderly inhabitants. Although there are but half the number of gateways, yet each house has its *own* gate quite distinct from that of its neighbours. To understand this, the reader is referred to the plan in Plate III.

For reasons to be explained in due course, the plots of land whereon the different houses are built are in the form of an irregular octagon, having two of its bases curvilinear. The two *segment-shaped* bases of a pair of contiguous gardens fitted together become a miniature crescent; forming part of this are the gates. The gates stand at an angle of about 60 degrees with the avenue. This disposition



Duplex Entries to Houses situated on the Avenues and Promenades.

affords great convenience in entering and leaving the carriage sweeps, because the necessity of joining the roadway at right angles and of turning 'sharp' to the right or left—viz., at a right angle, a manœuvre which has capsized many a vehicle—is obviated.*

The elevation of such duplex entries as are shown in the illustrations is merely typical, for they provide an excellent and endless opportunity for the exercise of artistic architectural treatment.

The value of grass in enhancing the beauty and pleasure of civic life is only exceeded by that of trees. Trees, however, should be planted, not only with the greatest care, but with much discretion, otherwise they may prove not unmitigated blessings. This arises from two principal causes: Their effects upon road surface, and their interference with public lighting. Those of my readers who are either motorists or cyclists will be best able to appreciate in its true importance the first disadvantage. Trees are fatal to the maintenance of proper road surface if this be of 'macadam' or other mode of agglomeration, as carried out in prevalent practice. Directly one runs into a picturesque and shade-giving avenue of trees one runs in bad weather into a quagmire,

* Although it is advocated that the stream of vehicles should be unidirectional on either side of the avenue, that, of course, only applies to through traffic, the ordinary 'rule of the road' otherwise applying. It may be mentioned that the maximum distance from one circus to another is but some 600 yards, the lesser not exceeding 420 yards.

or in fine weather on to a section of road characterized by much unevenness of surface. This is particularly noticeable in some parts of the Continent, where equally spaced trees are planted, especially if the road be running approximately east and west. The Rhone Valley might be mentioned as an example. Those portions of the road shaded by trees remain soft long after the unsheltered have dried hard; the consequence is the wheels sink into the softer sections, the depressions thus made being accentuated by succeeding wheels, with the result that the road-surface becomes a kind of 'switchback,' entailing great diminution of comfort, with increase in traction and cost of upkeep. I would therefore urge that in Garden City, in those thoroughfares which may not be paved, no trees be planted in suchwise that they shall overhang the carriage-way.

In paved thoroughfares the delicious and beautifying effect of trees is not coupled with these disadvantages, but they may have others unless care be exercised. In some cases trees have already proved themselves very deleterious to the efficiency of street lighting, especially where the electric light upon the 'arc' system is employed—namely, by means of large candle-power units emanating from high standards. In one or two London suburbs the effect is serious in clear weather and dangerous on foggy nights, due to the almost total occultation of many of the lamps.

Trees, whilst adding to the beauty of a thorough-

fare, ofttimes sadly detract from its stateliness by confining its visible width to less than that of the carriage-way. This arises from the practice of planting them towards the centre of the thoroughfare—namely, close to the curbing. Unfortunately, this is the only method that can be followed in existing towns, and the result has been most happy in the broad *boulevards* of Paris and other wide-thoroughfared towns, but it does not follow that it should be adopted in Garden Cities, where the limitations are non-existent.

The system is open to the following objections: (*a*) It dwarfs the appearance of the road; (*b*) seriously shuts out the view; (*c*) darkens the windows of houses and shops; (*d*) obstructs the free use of the footways; (*e*) necessitates the provision of expensive root gratings; (*f*) it is unsightly for a number of years, until the trees mature, because of the necessity of enclosing them in 'guards,' things *utile* nobody appears to have been able to treat artistically; and, lastly, it creates the necessity for artificial watering.

In the case of Garden City, where the authorities will have the control, not only in maintenance, but also in the laying-out, all these defects may be remedied and *economy effected*, both in installation and upkeep, by the simple and common-sense arrangement of setting back the 'building-line' to the rear portion of the plots, and planting the trees *inside* instead of outside the boundary-line. By this simple device the nobility of an avenue is very

greatly enhanced. This from two causes: (*a*) The setting back of the building-line, and (*b*) the great increase in width between the two rows of trees, which, moreover, may, by this disposition, be allowed to grow to far nobler specimens. Trees growing in proper borders, such as can be dug and manured, can also be hastened in their growth and made more luxurious in maturity. Moreover, they need no artificial watering, and obtain the benefit of rain instead of town water.

With regard to thoroughfares composed of shops, the difficulties can be easily and economically met in a Garden City by allowing considerable increase of width of footway combined with grass margins, in which the trees would be planted; the turf *not* being continued up close under the trees, where it grows unsatisfactorily, but broken up by beds of appropriate plants not so sensitive to the indignity of tree droppings.

As to the embellishment of the central 'walks' of 'Grand' Promenade and 'Central' Avenue, this can be handsomely met—without detraction from its vista—by alternating the artistically-shaped flower-beds with tree and shrub beds, making use of such specimens as are of stunted growth. For bushes, which might be of close-foliage and evergreen nature, *Laurustinus*, *Euonymus*, *Tamarisk*, and such like, might be employed. For trees—which it should be a *sine quâ non* should be of open-armed and *légère genre*, in order to prevent obstruction of the *vista*—

Araucaria, Pinus austriaca, Abies excelsa and such like, might be planted.

The inspection of the flowers and trees has brought us to *Grand Circus*, shown clearly upon the plan. This need not be described farther than to say that it consists of a fountain at its centre, around which passes a continuation of the *Grand Promenade* with a handsome margin composed of an annular flower-bed replacing the grass borders of the straight portions.

> 'Fountains and Trees our wearied Pride do peaſe,
> Even in the midſt of gilded Palaces;
> And in our Towns, that Proſpect gives Delight,
> Which opens round the Countrie to our Sight.'

The object of these floral *cyclades*—with an occasional fountain—apart from beautifying the interior of the City, is precisely referred to by the author of the above lines, written in the sixteenth century—to delight the town-dweller by frequent Prospects of the surrounding country. In a 'wheel-shaped' city this delightful effect can only be experienced from a *single* spot, but by means of these *lieux d'avantages* we reap the advantage of rural vistas from many urban points.

Another short walk northwards, and we enter *Capitol Square*. What we may see there may largely depend upon the date at which my reader—whom I sincerely trust may not yet be feeling tired, for we have several other parts of the hypothetical City to visit together—may find himself in this *locus*

princeps. For one of the greatest difficulties I foresee, one which will call forth the wit and ingenuity of the authorities, will be to devise some *modus* whereby the advantages and attributes of their City shall be *en évidence* from its inception, shall grow *pari passu* with the increment in number of its inhabitants, and yet be, at all periods of its aggrandizement, and remain, proportional to *pro tempore* requirements. These novel idiosyncrasies arising in the development of a Garden City will necessarily present, in due course, certain engineering difficulties; these, again, must be met by patient thought and ingenuity.

Such problems present themselves principally in the proper and apposite proportionment of expenditure upon plant and machinery necessary for the proper and efficient carrying on of the various public services—water-supply, sewage disposal, electricity, gas, etc. Of these, the first, a necessity of life, stands foremost in importance, both in regard to the paramount necessity of its provision and its proportionment at various stages of the City's development.

For example, the provision of a large waterworks, the construction of great reservoirs, and the like, would be quite disproportionate to immediate requirements, and would for years remain disproportional, entailing not only disproportional expenditure, but waste through interest of money uselessly expended, amortization, an excessive cost of upkeep, and other

causes. I will not weary the reader with technicalities; suffice it here to say that the provision of a water-tower would be indispensable, as well as highly advantageous in regard to protection from fire. But the expense of the necessary water-tower is very great, the thing, in itself, usually unsightly.

Can we call upon *Hermes*—who holds aloft his lamp of invention upon the cover of our book—to come to our aid? He will not fail us, for he is the messenger of the gods—of invention and otherwise; he in *sua persona* has himself solved the *dignus vindice nodus* of aerial flight. We have only to despatch him to the realms of common-sense, and upon his winglets—so deliciously out of all proportion to the area we poor terrestrial engineers must needs provide—upon these pigmy winglets will he promptly return with a message of compromise—a compromise between expenditure, utility, and art. In fancy I hear him whisper, 'You might combine your water-tower with your administrative offices—which you *must have* forthwith—make that your basis, and rear above them a large tank of adequate height and proportions. You need not make it hideous, you need not spend any money upon its supports, for these you can so design that they shall form the staircase and central-hall of your "Capitol," an agglomeration of utilities. Its four massy piers—if properly designed—may some day form the *coigns* respectively of your Free Library, of your Museum, of your Council Chamber, of your Town

Hall. Four buttresses, as it were, to your City, to which I wish every success, for it is in accord with my metastatic views, because it lightens my task by propitiating my masters the gods of innovation. Powerful buttresses it is your bounden duty, at this epoch in civilization, to build, whether or not you would have a water-tower.'

Thanks, good Mercury !—grace to your whisperings, it may be that one day my kind reader may stroll into *Capitol Square*, when it shall present the appearance shown in Plate IV., at a date when its northern side shall be bounded only by a beautiful balustraded terrace of elevated gardens; pigmy *replicæ* of those of Babylonia of old, though those were floored with asphaltum, these with concrete. An ornate terrace, built almost without expense, for the flower-beds reposes upon the roof of the municipal offices, where, unseen by us, is carried forward the work of organization and development, to result in the rearing of a superstructure displacing the flower-beds, but neither the terrace nor the handsome vases of bright flowers. Anon, therefore, the reader might visit it, when it should present such an aspect as we see in Plate V., the erstwhile terrace now playing the part of *entresol* to the completed building. At present we must remain in the gardens ; the interior of the terrace is, of course, the sacred *sancta* of civic dignitaries, with their attendant municipal staff.

Labor omnia vincit ! Hence a little patience, and

we may then enter this superstructure, saunter through its museum we see in fancy well lighted by those arcaded windows, or rest us from the noon-day sun—which still deigns *occasionally* to visit our Isles, but very occasionally—so that it were, perhaps, more appropriate to say shelter us from the rain in the sanctity of the reference library at the rear, or listen to sweet discourse of chaste melody from the fine civic organ in the Town Hall, forming the East Wing; or we may come out upon what remains of this same terrace, now transmuted into a continuous balustraded balcony, running entirely around this handsome municipal combination. For the present we will smoke the cigar of contemplation, inspired by the strains of the workmen's orchestra, varied by the interjections of the soothing fountains.

But economy! In fancy I hear the authorities saying, 'Economy, please! at every step.' Of this I am not unmindful. No doubt, gentle reader, you thought I was *wasting* that water you heard so musically plashing and saw cast aloft to give pleasure to the eye and freshness to the air. But you were mistaken, for I ought to have explained to you when you were so pleasantly employed culling the daffodils by the lake in the *People's Park* (about 750 yards north-east) that *this* is the *same water* you there stood beside—the same, indeed, as that running over the basin in the middle of *Central Circus* (about 480 yards south). Our municipal

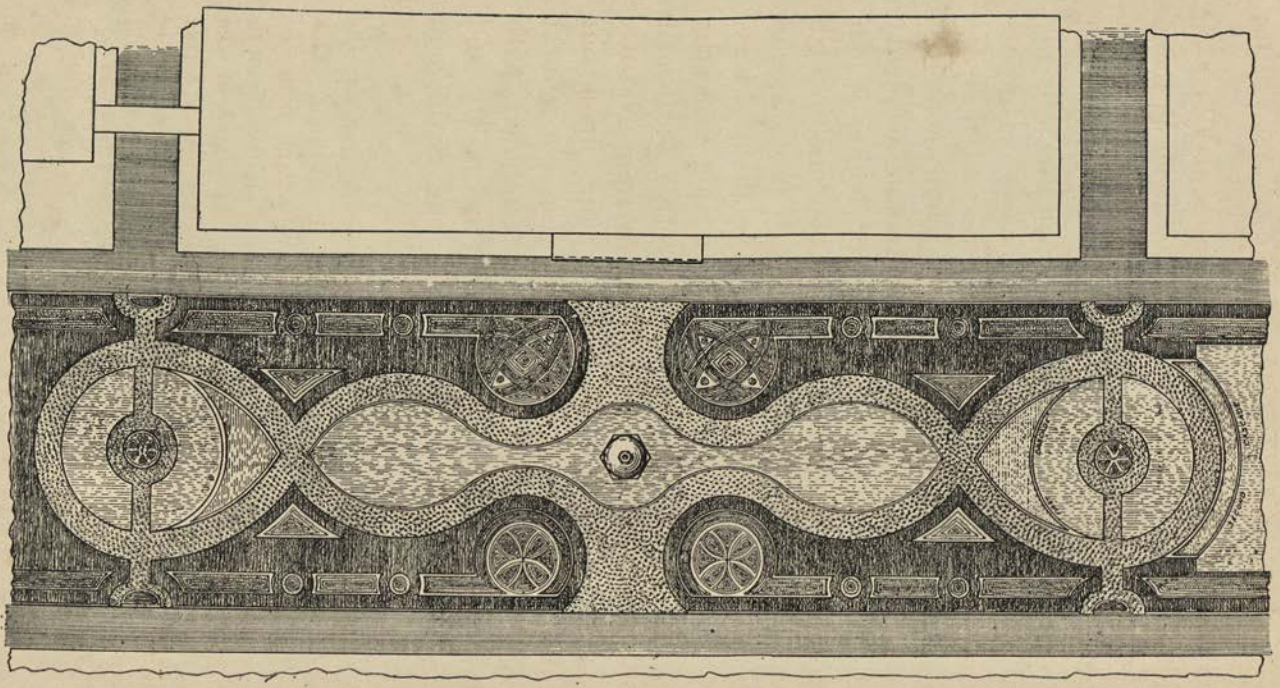
electricity costs us but a fraction of a penny per unit,* and it were false economy to stint the electro-motors which circulate the water, for that would mean, not only that we should have continually to renew it, but we should entail expense, due to its stagnation, in periodically cleaning out the fountain basins, whereas the constant and pleasure-imparting falls and fountains keep the same water always fresh, sweet, and clear.†

It may, perhaps, surprise the reader if I say that the fountains in Trafalgar Square—about the only ones that 'play' and enliven by their display a spot in dear, dirty, dingy old London—are in reality only the circulation of condensing water from the engines at the pumping-station in Orange Street, the arrangement being one combining utility with economy in the process of water-cooling. This explains why the November water-urchins, looking vainly for 'tiddlers' in the basins, stand open-eyed at the apparition of the fountains emitting steam as well as water. Anent this, there may even be 'sea-urchins' in Garden City, for down on 'the sands'‡

* At Vickersville (Barrow) with steam production its cost is but ½d.

† The oxygenation of water by aeration is quite in accord with natural law. As a good exemplification of its successful application may be cited the fact that during all the years the Crystal Palace Aquarium was open to the public the sea-water was *never once changed*, the requisite aeration being efficiently performed by a small jet of air injected at the corner of each tank.

‡ The 'sands' put down by the London County Council in



Plan of 'Capitol Gardens.

in the *People's Park* chubby youngsters may be seen 'paddling' in *salt* water kept always fresh in foaming, by artificial circulation, over 'the rocks.'

To save us coming back to *Capitol Gardens*, whilst here, we may as well glance at the plan in Plate VI., and thus carry it away in the mind's eye. Here we have a 'lung' for the populace, represented by an open space of some 15 acres. At this moment it is a wheat-field, but we have doubtless among us plenty of 'Sir Joseph Paxtons' capable of laying it out in appropriate 'landscape-garden' fashion—indeed, many fashions. Obviously there are *two* ways of doing this: the costly way and the economical way. Now, I venture to suggest that, in this case, the cheaper would also be the more effective, *because* it would constitute a lesser departure from Nature. We can all, at any moment, repaint upon our mental *retinæ* the pictures of the two finest examples of landscape gardening combined with fountains our world possesses of the costly and artificial type—the gardens upon the Sydenham

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Victoria Park have proved an endless source of pleasure to the youngsters who go there to build their 'castles of sand.' This success led to the laying down of sands at Fulham, with the unforeseen and amusing result that 'grown-up' children took to paddling, and this with such avidity that the places of the children became usurped, until the authorities brought in a rule prohibiting adult paddling. It is obvious that sea-water (originally produced by the admixture of *sea-salt* with fresh water) would be even more strengthening and beneficial.

Hills and those at Versailles. But whilst admiring the skill and broadness of view of Paxton and Le Notre, still will the thought arise, Which is the more beautiful—that due to the artifice in these or the attributes of Nature's own gardening we admire elsewhere, as, for example, in the Borromean Islands, natural gems set in the placid surface of *Lago Maggiore?* Whether a sheet of water looks best when it ripples up against a margin of bright green grass, or when it is confined within a lithic frame of cold grey? I would advise, try 'Nature's first'—*i.e.*, merely form the lake *sans artifice*, with neither walls nor parapet, merely 'pugging,' as one does a reservoir, and carrying the soft green sward down to its limpid margins.

An artistic orchestral *kiosque* might, with several advantages, be placed in the centre of this miniature lake.*

* Among the advantages is the fact that the presence of a sheet of water reinforces in a marked and charming manner the sound of music. This many of us must have noticed in connection with the gondola music at Venice, and even upon the Upper Thames. But the value of even a small expanse of water was impressed upon me when, in conjunction with Mr. R. E. Crompton, I carried out the first public exhibition of the electric arc-light in this country, and when one had to use dynamos procured from abroad, and long before the advent of the 'incandescent' electric lamp now usually employed. No electric lamp-posts were available, and to prevent artificiality as far as possible, two lamps, each of 4,000 candle-power, were run out over the lakes at the Alexandra Palace upon a steel cable. The orchestra projected over the water, the audience sat in an arena

I say 'artistic' advisedly, because such a thing is hardly to be found in our country, although they exist abroad, and hence doubtless our architects will see to it that such shall exist in Garden City *primus*. 'Hermes,' no doubt, will again advise how to make such an erection do *triple* duty, and play the parts of chaste ornament and handsome water-temple by day and a sheltering 'sound'-board for the musicians by night. If one might dare venture to suggest the addition of a beautiful thing, yet not a necessity, I would say let electrically illuminated fountains be borne in mind. They came about originally from a suggestion made by His Majesty when Prince of Wales;* and as I had the pleasure and gratification of carrying them into effect, I would venture to suggest their subsequent installation, for there is

around the lake, and the fact that the intervening space was occupied by water proved to be both charming and advantageous. A bandstand should invariably be surrounded by a broad annulus, be it by water, grass, or flower-beds, to increase the effect, and to keep the audience at a distance from the orchestra. In any case, moreover, the circulation of streams of people in conversation, which entirely robs those seated of their enjoyment, should be prevented by the simple expedient of causing them to promenade *at the back* instead of, in the present ill-thought-out system, in front of those who really appreciate music and desire to listen to it. The plan is so drawn as to enable this to be done.

* His Majesty made the suggestion—if I may say so, one most *apropos*—when President of the Health Exhibition, 1884; and an abundance of electricity and a splendid head of water, derived from the top of the Albert Hall, enabled the idea to be carried out upon a scale never since equalled.

certainly no reason why such a beautiful form of fountain should not make its appearance in Garden City '*some day.*'

From considerations such as I have mentioned I would keep down, as far as may be, all artificiality in regard to statuary, lamp standards, and the like. A very beautiful effect is obtained in the wide garden thoroughfare of Southport* by covering the trees with myriads of electric 'glow' lamps. I must, however, saunter no longer in *Capitol Gardens*, for I have a weight upon my mind, and desire to unload it.

During the compilation of these pages I have received numerous letters, have been asked many questions, and have been requested to endeavour to sandwich several important provisos into my proposal. One from 'a probable resident' is worthy of most careful consideration. It amounts to this: Can any system be devised whereby, whilst observing regularity in the laying-out and symmetry in the building and appearance of the completed City, it shall be practicable, for example, to offer to one inhabitant a site, say, of twice, or more, the ground area of that desired by another, without delegating him to a specific locality where plots of the size he may desire are alone to be found? It is by no means an easy condition to fulfil, and obviously is unattainable by the usual and very inartistic mode of

* See photograph of Lord Street.

dividing up the land into so many oblongs of equal area, of monotonous regularity, and wearying repetition.

Later in this chapter we shall see that both convenience and sightliness may be combined with economy by the employment of the 'bee' conformation. This, however, arises principally from the fact that in a village it is neither necessary, nor is it financially advisable, to provide an expensive highway frontage to each plot. The system of hexagonal apportionment of the land—in a modified form—will also, as I shall hope to show, prove beneficial in the laying out of the City as well as the village. But in regard to Grand Promenade, beating about to discover some means of complying with the desires of correspondents to which I have referred, I hit upon a modification of the octagon as a very convenient solution in respect to those inhabitants who are desirous of keeping either motor or horse-drawn carriages.

The object I had in view in deciding upon the hexagonal cellulation of the land was to avoid all wastage in the process of dividing it up; to avoid all wasteful corners, and to take such a one of the polyhedra as can be multiplied, and yet so fitted the one to the other that no spaces shall be left between each polygonal division of the land. To do this one must conform rigidly to the 'bee' or

hexagonal subdivision. In the case we are now considering a different result is sought—viz., to obtain the division of the land into plots more convenient and advantageous—at the same time more artistic—than the usually employed oblong, and to carry this out in combination with spaces—also of convenient area and shape—adjoining such plots, and so disposed in relation to them that they can be allocated to one or other of several adjacent householders.

In the diagram (Plate III.) is shown a portion of Grand Promenade, with the land laid out on either side of it in such manner as to obtain the desired result. The space, it will be observed, is divided up along the boundary-line by a number of irregular hexagons, the longer bases of which form the 'frontage.' These polygons, however, are really modified octagons, as will be seen by reference to the completed octagon, a portion of which is shown in dotted line. The object in making use of the octagon in this instance is that, in fitting a number of eight-sided figures together, be they the tiles one constantly sees used in our conservatories or areas of land, such as those plotted in the diagram, and which are each about $\frac{5}{8}$ acre in extent, a square must invariably be left as the space between each four contiguous octagons. In the diagram these squares have sides 100 feet in length, being thus roughly $\frac{1}{4}$ acre in extent.

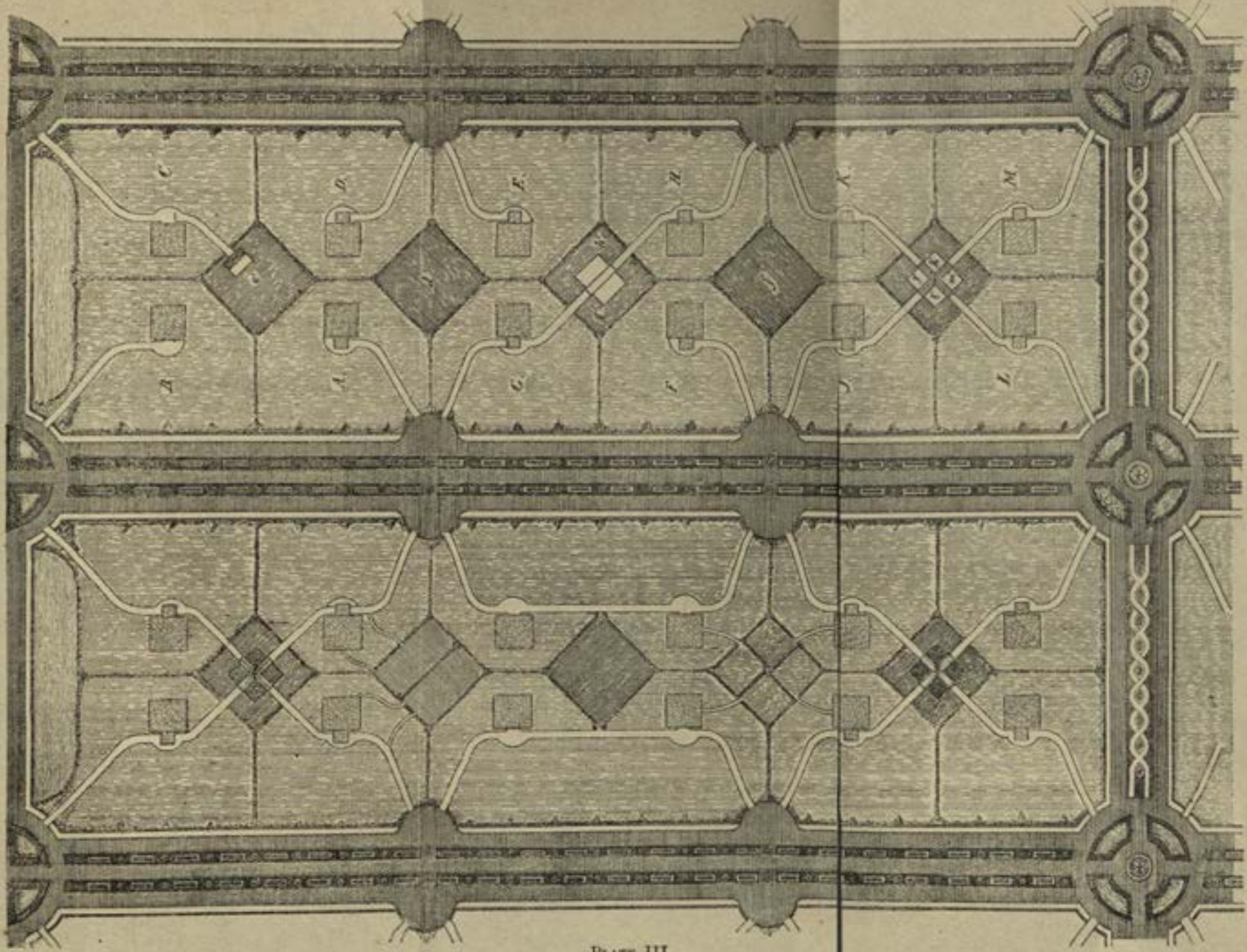


PLATE III.

Plan of Grand Promenade, showing Contour of House Plots, Garden Plots, Duplex Entries, Duplex Stabling, Quadruplex Motor Garages, etc.

Grand Promenade, therefore, by reason of this configuration peculiar to it, is composed of a number of plots offering a number of advantages. For whilst they preserve uniformity of frontage length, they provide for great elasticity in regard to the fulfilment of the requirements and desires of intending occupiers of the dwellings which may be erected upon them. Suppose an inhabitant should wish to occupy only the *minimum* area of ground provided for—and who does not require either to have a stable or a kitchen-garden?—he would rent merely the irregular hexagon A. Let us assume that his neighbour B is of the same way of thinking, but that, on the other hand, their two neighbours C and D should desire, the one to have a stable, the other a kitchen-garden. Either or both of them can have their requirements fulfilled by renting one of the contiguous squares c' and d', in which case each would increase the size of his ground to 37,000 square feet or $\frac{7}{8}$ acre approximately.

If we consider the conditions obtaining in regard to the more wealthy portions of existing towns, we shall not find the case to be by any means that each resident keeps either horses or motors; and I feel that, if provision be made in regard to stabling for *one in every four* of the residents, this would certainly be as much as would be taken up in actual practice. A glance at the diagram will

show that one square is provided to every two houses. Now, if half of these be utilized for stabling and the other half for kitchen-gardens, then the proportion works out to the one I have named—viz., a stable to every fourth house.*

I now come to a point of great convenience and a measure of considerable economy in regard to stabling. The provision of stables is a serious item, where each householder must necessarily provide for the stabling of his own horses or motors. In the case of ordinary villa residences, it may be taken that a well-appointed stable, coach-house, and covered washing-yard would cost about one-third as much as the residence. This arises from the necessity of providing the horse or motor with a residence of its own. It is, indeed, a recrudescence of the difficulty in the economics of construction I touch upon elsewhere in regard to isolated cottages and dwellings. To get over this difficulty, it is usual in large towns to build stables in terrace form, viz., by the formation of mews, most unsavoury places, possessing similar unsanitary and other disadvantages—but to a greater degree—as those inherent to terraces of dwelling-houses, which latter, I trust, would be entirely prohibited in Garden City, where, *cela*

* By the employment of duplex and quadruplex buildings, subsequently suggested, however, the proportion may economically be brought up to a stable for every house.

va sans dire, mews should also be strenuously tabooed.

How, then, can we effect economy without the disadvantages referred to? We can do so, with the modè of division of the land now under consideration, in a very simple and effective manner—viz., by building the stables in the centres of the squares thus provided and shown. The stables would be erected in the centres of the plots, *either two or four together*. Let us consider the economy brought about by the construction of blocks consisting each of two sets of stables, coach-houses, and lofts, but with one washing-yard covered with a glazed roof, the yard and roof being common to contiguous neighbours. Suppose, for example, that neighbours G and H desire both to keep horses; obviously it is sheer waste of money for each to build a stable from drain-pipe to chimney-pot. If, however, instead of this, they jointly make use of duplex stabling erected on the square *g'h'*, they can do so at a cost of little more than half that it would cost them severally. Under these conditions, the plot E would be let to a tenant desiring neither stable nor kitchen-garden. The occupier of plot F, however, might desire the latter, in which case he or she would reserve for use the $\frac{1}{4}$ of an acre afforded by square *f'*.

Let us now take such a case as that of neighbours J, K, L, M, all desiring to keep horses. In

this case still greater economy may be effected by the joint occupation by them of a quadruplex set of stables erected upon *j'k'l'm'*. To bring things up to date, let us assume the four next neighbours to be a jovial fraternity of motorists. What could be more convenient and economical than that their inanimate steeds should be housed in a quadruplex motor-house erected upon the square enclosed by the domains of their four respective owners, such quadruplex 'garage' containing a small workshop and set of tools common to the quartet of *automobilists?*

Many more conveniences could be made to accrue from the 'give-and-take' facilities offered by this mode of dividing up the land. For example, instead of each of four neighbours keeping up separate tennis-courts, some of these squares might be utilized for this purpose; for, seeing that the squares are exactly 100 feet long in each direction, ample space is provided for the installation of two tennis-courts in each jointly occupied square, yet leaving plenty of room for circulation round the players. But the practical tennis-player, glancing at my plan, will at once perceive another great advantage—viz., that he would not be called upon to spend half his time in groping over flower-beds nor in making unwanted peregrinations into the public highway to retrieve errant and self-secreting balls, seeing that the 100-feet squares will be bounded by a tall partitioning in the form of an

espalier, which will effectually constrain the too lively and elastic playthings.

Speaking of *espaliers* reminds me that I must go back for an instant and explain to the reader how it was that in walking up 'Grand Promenade,' although the back-gardens of the houses were in front, and he was informed that many of the villas were provided with vegetable gardens, yet none were to be seen, neither was any disfigurement of any kind to be discerned from their existence. I have explained that the portion of the site on which the City proper will be built is more or less of a plateau ; now, if the reader will kindly carry back his thoughts to the laying out of other towns consisting principally of villa residences, which one can easily do if one calls to mind the case of some of our rapidly-rising seaside resorts, he will appre ciate that the usual process of developing a town by dividing it up into rectangles enclosed by barren and austere walls is anything but an artistic, not to say æsthetic, system.

When occasion arises it is easy enough to hurry forward the buildings, but Dame Nature is not to be hurried with her beautifying artifice-subduing and verdure-imparting vegetation. It is therefore essential that every available means should be taken advantage of and insisted upon to expedite the bringing about of vegetative maturation, and to plant out the Garden City at as early a date as

possible with trees, shrubs, and creepers. It is comparatively easy so to 'peg out' that the planting of the trees may precede the erection of the buildings, but the creepers upon the latter, it may be well argued, cannot be started upon their beneficent errand until the latter are *in esse*. Even in regard to this difficulty we may effect with a little thought a beautifying compromise.

The principle I would advocate, which is shown diagrammatically in Plate VII., Fig. 1, is this: As soon as the roads have been marked out and a *rustic fencing* put along their edges—not the usual hideous barren and straight-lined *British paling*—an *espalier* fence, consisting simply of not inelegant posts cast in a cheap alloy of aluminium—so that they shall be rustless—should be installed. These posts would support simply a set of continuous wires, or they might be connected, the one to the other, by panels of 'expanded metal,' upon which ivy and quick-growing creepers and such-like shall be planted. Outside these means of demarcation of the exterior edges of the polygonal plots described, shrubs could at once be set, and protected by hurdles attached to the inside of the *espaliers*.

By this means, instead of many thousands of pounds' worth of unsightly walls being built; instead, moreover, of the eye being offended by our seeing, whilst walking in the one avenue, the backs and more than we desire to see of the domestic

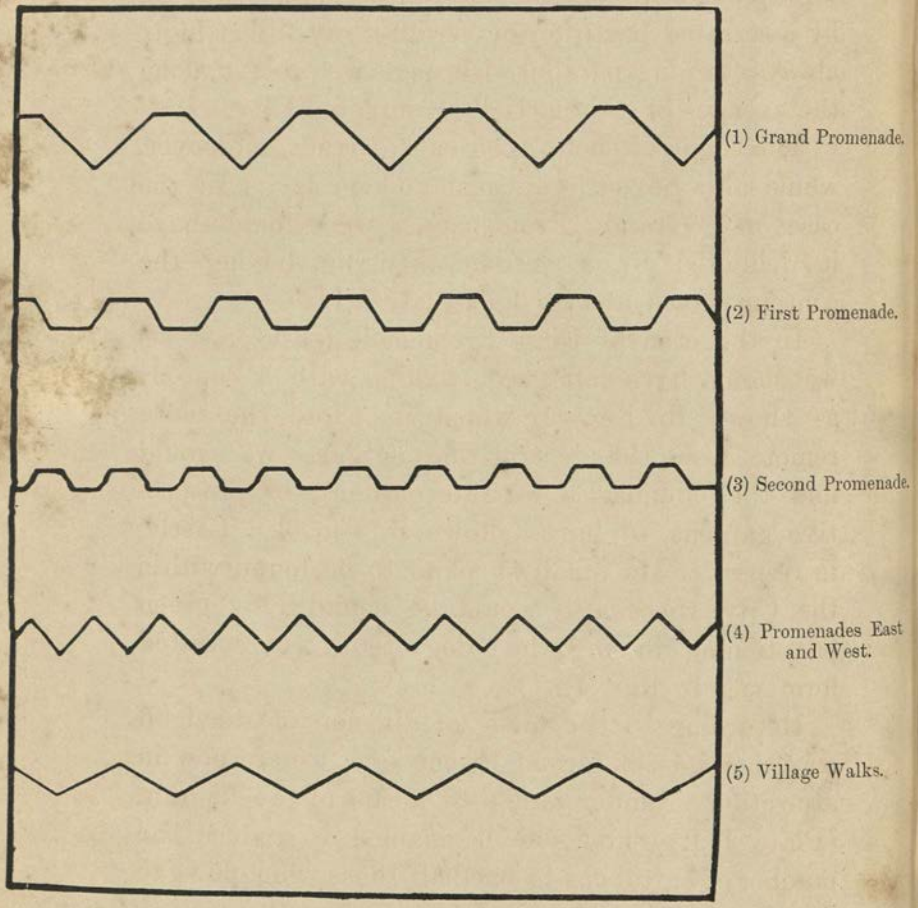

(1) Grand Promenade.
(2) First Promenade.
(3) Second Promenade.
(4) Promenades East and West.
(5) Village Walks.

PLATE VII.

economy of the houses situated upon the avenue running parallel to the one in which we may be, we should have all that is objectionable shut off by a serrated partition of verdure, say 7 feet high, always running parallel with us as we proceed along the avenues of the partially-completed City.

The shape of such green backgrounds, moreover, would also be both unusual and pretty. In the case of 'Grand Promenade' we should have it delimited by a verdant hedging having the contour shown in Fig. 1 of Plate VII.

In the case of First Promenade (east or west) we should have soft green walling with a contour as shown in Fig. 2, whilst in those the more remote from the central thoroughfares we should find the boundaries of the gardens, or prospective gardens, to be as shown in Fig. 3. Lastly, in respect to the smallest plots to be found within the City, these also would be bounded by green partitioning having the 'dog's-tooth' or serrated form seen in Fig. 4.

Returning to the mode of division of the land on either side of Grand Promenade, we are now in a position to understand—by means of the diagram (Plate III.)—how one is enabled to reduce the number of entrances to one-half those which have to be provided in thoroughfares of current practice, a matter to which reference has already been made. In order to cover all contingencies, I have assumed

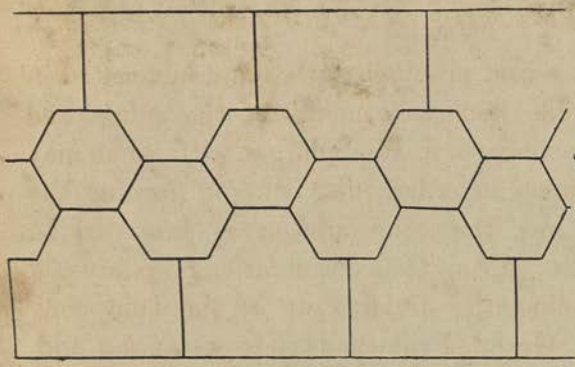
the houses on Grand Promenade to require for their emplacement a space equivalent to 40 feet square. These, as will be seen, have been plotted in such a manner that their porches or porticoes stand back from the road a matter of 112 feet. Apart from the great advantages accruing to the convenience of pedestrians, economy is effected in garden-land space as well as in monetary expenditure by the single gate system I propose ; for the ordinary *quasi* semicircular carriage 'sweep' leaves much to be desired in this regard. I am afraid that the open, undelimited method I have referred to as obtaining in some American and Canadian cities would not appeal to Englishmen generally any more than it would to me, for I think we should all wish not only to have our own gardens, but our own carriage-drives, and these properly protected by gateways. Nevertheless, it is to be hoped that in Garden City there will be developed a certain increased measure of fraternizing which will do something towards breaking down the insular prejudices of the average Briton, an idiosyncrasy with which we are often, not unmeritedly, twitted. I have assumed, for example, that, when conveniently practicable, it should be considered quite the thing for one of four motor carriage owners to drive through the grounds of either of his other three neighbours, and I have plotted the private carriage-ways in such a way that they not only have given to them a graceful

curvature, but that they shall offer ready facilities for treatment under the skill of the landscape gardener. A visitor, for example, having paid a visit to resident X, and having 'stabled' his motor in the joint motor-house, instead of being put to the trouble of turning—a consideration in our modern long wheel-base motors—would pass out through the grounds of neighbour Y and emerge upon First Promenade East.

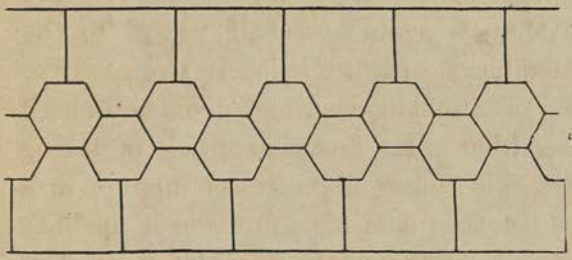
Having now, I trust, sufficiently demonstrated that there are modes of laying out land more conveniently and more economically than those which have come, apparently, to be stereotyped, and having also explained how such may be carried into effect, I will pass on to the consideration of the laying out of 'First Promenade West' (or East). Here we are dealing with the plotting out of areas, though still very liberal, yet less ambitious than those in the 'Grand Promenade' or in the 'Grand Avenue'; for whereas those had an average area of an acre, with a frontage length of 200 feet, these have the reduced area of half an acre, and the shortened frontage of 150 feet. In regard to these, careful consideration has led me, in order to be able to offer a variety of choice to the incoming tenants, varying from a *minimum* of 15,292 square feet (rather more than one-third of an acre) to a *maximum* of 34,777 square feet (or, roughly, three-quarters of an acre), to revert to the hexagonal

configuration first proposed by me and advocated in regard to the home allotments of the village and elsewhere explained, in combination with what may be looked upon as an irregular octagon forming the minimum area the configuration is intended to comply with. From the considerations already set out concerning the dividing up of the land contiguous to Grand Promenade into octagons and minor rectangles, the reader will at once see that similar advantages again accrue in regard to the multiple subdivision of these half-acre plots. Take the instance of a tenant desiring to confine himself to a flower-garden. He has the option of taking and building his house upon the minimum area apportioned to the particular promenade he may have selected by renting the 'frontage' plot of land of one-third of an acre in extent. Should he desire, in addition, a 'walled-in' kitchen-garden, he would take in conjunction with the frontage plot the hexagon immediately behind the site selected by him. If a stable or joint stable be desired, one of the two hexagons on either side of such site would be comprised; whilst, if more land were desired, then two or three additional hexagons could be taken in, in which case the total area could be increased to either *two-thirds* or *three-quarters* of an acre, or more than double that of the *minimum* and twice that of his neighbour.

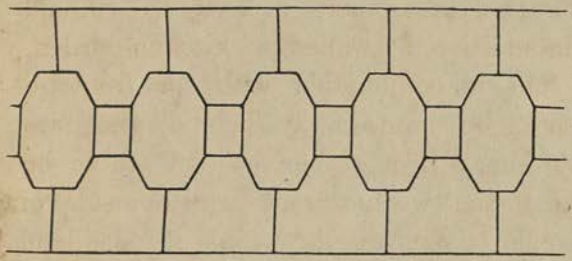
I would now wish to draw the reader's attention



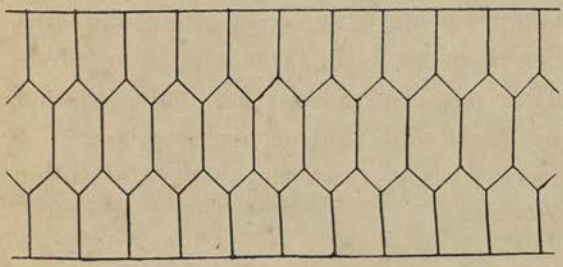
'First Promenade West.'



'Second Promenade West.'



'Third Promenade East.'



'Fourth Promenade East.'

Contour of the Plots in the Different Thoroughfares of the City.

to another great advantage the novel mode of dividing up the land I propose presents from that of the ordinary practice—namely, by means of rectangular plots. In the latter the houses obviously must be placed 'back to back,' in this presenting the undesirable feature of a minimum space between the back windows of each *vis-à-vis* pair of houses.*

In regard to the conformation we have now under discussion, it will be seen that the houses are 'dodged' or 'staggered'—that is to say, an open space is preserved behind each dwelling, so that, from all the back windows, an uninterrupted view of the surrounding country is obtainable, instead of an unwonted peering into the domestic arrangements of one's neighbour's dwelling. This happy circumstance—resulting from the specific mode of plotting out—enables one to arrange that the flower-gardens shall be displayed in front of the villas instead of hidden behind, a disposition very greatly enhancing the beauty of the thoroughfares of the City.

We now come to thoroughfares — such as 'Second Promenade West'—having plotted areas in individual extent half that of those we have just described. Here, again, happily—in regard to these

* In regard to Promenades Four to Twelve East, while the extent of land allocated to each is appropriate to the size of house, I have thought it unnecessary—indeed inadvisable—to provide for this.

quarter-acre plots—one is enabled to repeat the hexagonal configuration with precisely similar advantages, but carried out upon a lesser scale than those before obtaining.

Thus, in the case of a tenant desiring to make use only of a small portion of land, to be utilized as flower-garden solely, he would rent the minimum space available—viz., the frontage plot of one-fifth of an acre. Should he desire, in addition, a 'walled-in' kitchen-garden, he would add to this the hexagon immediately behind him, in which case his total area would be increased one-third; that is to say, to his one-fifth of an acre flower-garden he would add one-fifteenth of an acre vegetable-garden. For a motor-house or stabling he could take either of the laterally-situated one-fifteenth of an acre hexagons, whilst if he desired still more land he could use the remaining one-fifth of an acre hexagon. From this it will be seen that tenants in that particular promenade will have the option of taking with each house land of either one-fifth, four-fifteenths, one-third, or two-fifths of an acre in area.

Two more of such thoroughfares, such avenues, viz., '*Third*' and '*Fourth*' Promenades West, bring us out to a charmingly situated portion of the City site and the plantation known as 'Letchworth Corner,' a spot where we meet with the beautifully laid-out grounds of the Hydropathic establishment. It also brings us to the confines of

our City in the westerly direction, for we find that it is not necessary to follow the sun further to provide for the housing of the maximum number of inhabitants it is desired the City shall provide accommodation for.

Eastwards, however, the City is carried to a greater extent by the provision of longitudinal thoroughfares, laid out in such wise as to afford an average area per plot of *one-eighth of an acre*—viz., Promenades Four to Twelve East. Before coming to these, however, we have another area plotted out on a somewhat different system—viz., by means of elongated octahedra, with the following objects in view.

The idea is that similar advantages to those above enumerated should accrue to even those tenants who do not desire to occupy a minimum area of land greater than that provided for the workmen in the village—viz., one-sixth of an acre; also that such tenants as desire to spend but little time in their kitchen-gardens should be able to have a *small* one situated immediately behind their dwellings, whilst those desiring to have a house with moderate frontage and flower-garden of moderate size—as, for example, those with larger families—who require a *large* kitchen-garden, could obtain it. Thus, upon this particular promenade each house has a minimum ground area of one-sixth of an acre, with a *small* kitchen-garden; but by taking the one-twenty-fifth of

an acre rectangle this may be increased to a little over one-fifth of an acre. If a large kitchen-garden be desired, then the octagonal one-seventh of an acre may be taken, in which case the amount of land going with the house would be one-fourth of an acre; whilst if the one-twenty-fifth of an acre rectangle be also taken, then the total amount of land belonging to the house is increased to rather over one-third of an acre. An enthusiastic horticulturist, or one of small means, requiring only a small dwelling, and desiring to earn money from his produce, could, indeed, increase his one-third of an acre by another one-seventh in taking in the adjacent octagon, in which case his total area would be more than half an acre.

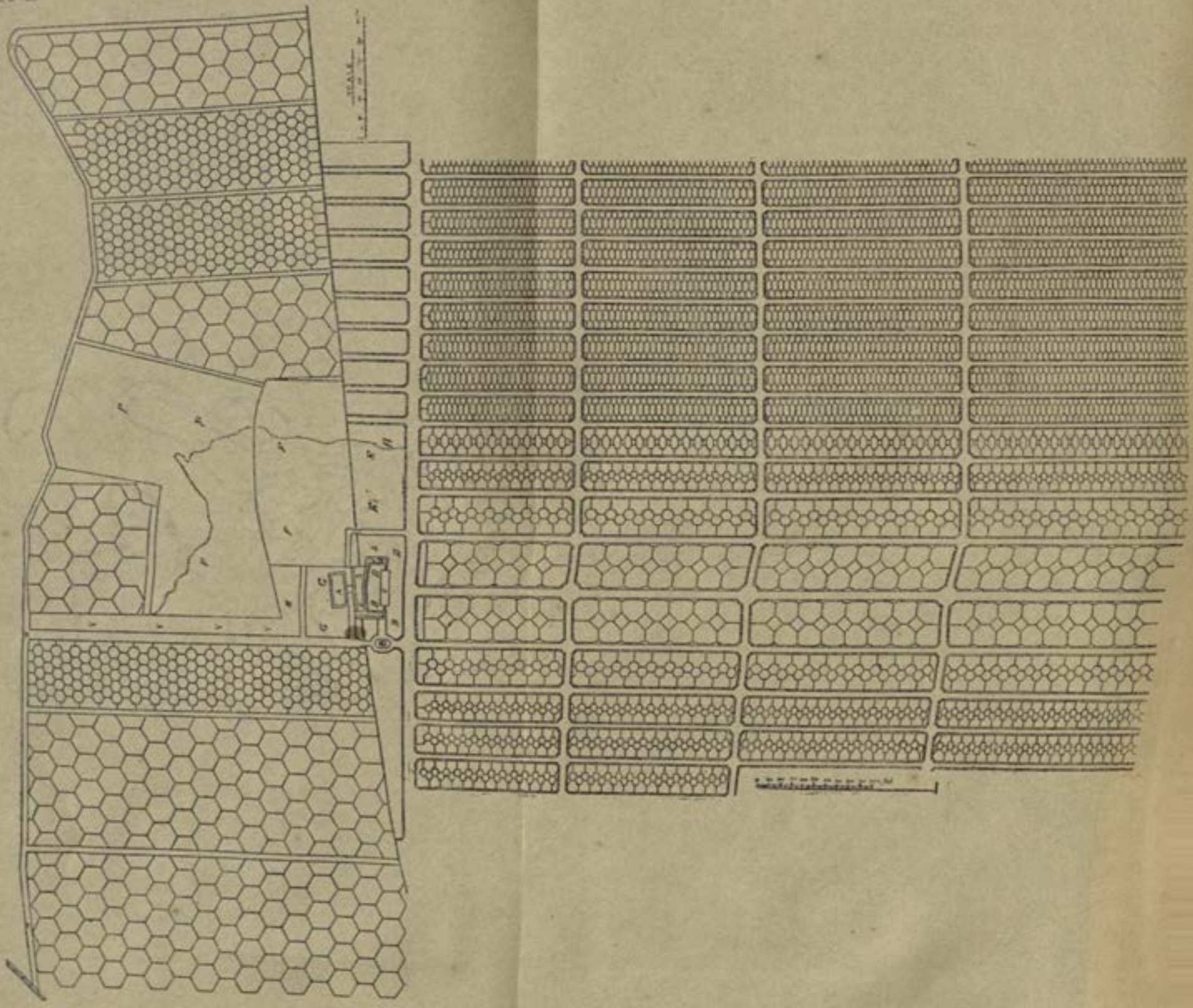
For the smallest plots in the City—viz., those situated upon the outskirts—and providing an average area of *one-eighth of an acre*, which are intended to fulfil the requirements of those who do not desire to spend much either of their time or money in gardening, I have found that six-sided lozenges as interchangeable additional areas, in combination with irregular pentagons as frontage plots, best fulfil the *desiderata*. This mode of land division will also be found illustrated. In regard to these plots it is assumed that the occupiers of the houses will not desire to keep anything beyond the omnipresent bicycle or probably a small motor *voiturette*. For this and for other purposes a reason-

able amount of space between and surrounding the dwellings is available, seeing that the frontages have a uniform width of 50 feet. Here, again, the configuration offers to the inhabitants two valuable advantages. In the first place, whilst those who may so desire are not called upon to take any more land than a minimum area of 3,375 square feet (about one-thirteenth of an acre),—the smallest allowable in the City—yet by assimilation of the polyhedra, each containing 3,250 square feet, or about one-fourteenth of an acre, they may have, if desired, double, treble, or even greater multiples of this minimum. Another advantage will at once be seen, by reference to the plan, in the fact that the individual gardens are 'dodged' or 'staggered' between each contiguous pair of dwellings. By this means a family in their 'additional' garden find themselves at the maximum distance from their neighbours, and therefore overlooked to the minimum extent.

I hope the reader—as also my correspondent who sent me the 'nut to crack'—will feel that by the means here described it *is* both possible and practical so to divide up the superficies of land that, *with perfect uniformity of plotting out and with regular and equilinear frontages*, provision for a considerable measure of elasticity, in fulfilment of tenant requirements, may be both practically and artistically carried out. I have one word, however,

to add in reply to those who desire to have a 'few acres about their houses' for fruit culture and other small agricultural pursuits — namely, that their wishes have not been overlooked, and that land at cheaper rate and suitably situated is to be found by them abutting upon the roads forming prolongations of the avenues, extending into the agricultural 'fringe,' which, being constructed in cheaper style, enable the land to be let at a lower rate than that curbed, paved, better lighted, etc., within the City itself.

I trust my readers may not have become wearied at what may appear to be too much detail, but it appears to me that it would be a thousand pities to neglect to direct adequate thought upon the important subject of laying out in connection with a town the possibilities in regard to which are, to my mind, quite unique.



Plan of City and Village.

General Description of Proposed Plan and its Relation to other Proposals

In the foregoing pages I have dealt somewhat fully with the division of the land to be occupied by the proposed City, and, even at the risk of appearing a little wearisome to the reader, I feel I have yet to say a few words concerning the ratios subsisting in my proposal as compared with those which have been previously made, for the reason that, from the point of view of health, this is one of the most vital of the points, and should therefore have accorded to it most careful consideration. I have already mentioned, in regard to open spaces, that the total area of these, being made up of thoroughfares, public places, and public parks, may have its components of varying ratios to the whole. So also in regard to privately utilized space, *its* area also may be composed, in varying proportions, of buildings and gardens. Upon what these ratios may be will largely depend the hygienic results and, *par suite*, the health of the inhabitants. The object to be

held rigidly in view obviously is so to arrange the proportional areas of the privately enclosed to the publicly utilized space available within the City, not only as to gain the desirable *minimum* density of population as related to the *whole extent of the City*, but in such wise that the *maximum* density of population, as related to the *privately enclosed* areas, shall be satisfactory.

I have already mentioned that, in regard to the proposed 'City of Hygeia,' the eminent hygienists who worked out the proportions were of opinion (though in expressing it they mentioned that even the factor of density of population *they* had taken might be considered as *somewhat high*) it should be taken as an axiom in a healthy city that the population should not exceed *twenty-five inhabitants for each acre.* Now, the problem before us is to provide the proposed City with thoroughfares amply adequate for dealing with the traffic, and at the same time of such proportions that they shall produce a bold and satisfactory aspect. It is, of course, quite simple—financial considerations *apart* —to comply with this *desideratum* by giving to the City thoroughfares and spaces quite abnormal in their vastness and in comparison to those to be met with in any existing town. We find this to be the mode of dealing with the problem resorted to both by Buckingham and Howard, but unfortunately—financial considerations *intervening*—this mode of

treatment leads us into a difficulty by reason of non-compliance with one of the factors I have referred to—viz., the density of population as related to the *privately enclosed areas.* It is, I am sure the reader will agree, unwise to provide an avenue of enormous width, such as that of Howard, in combination with a crowded density of population such as he proposes—*i.e.*, nearly four times greater than that prescribed as permissible by the great hygienists to whom I have referred. In order to endeavour to make this clear to the general reader, I have prepared, and here present, tables showing the idiosyncrasies of the proposals respectively of Buckingham and Howard, and of the one I have myself ventured to bring forward. From these tables many interesting things will be learnt, whilst, in regard to the points now under consideration, the efficiency of population density in privately enclosed areas, it will be seen, with the usual average of five per dwelling, works out as follows :

Scheme.	Density of Population of Enclosed Areas.
Sennett...	25 Persons.
Buckingham	55 „
Howard	80 „

From this it is abundantly manifest that the

proposals of Howard in regard to width of thoroughfares will require *drastic revision,* because it is obvious the benefits to be reaped from the open spaces of such thoroughfares are a hundredfold more than neutralized by the disadvantages arising from the division—as Mr. Howard states—of the available area into such small plots—numbering upwards of five thousand — having an average size of only 20 feet by 130 feet, which provides only about $\frac{1}{16}$ of an acre for each family. Taking the average inhabitants per dwelling at that mentioned by him—viz., as 5·5 persons, which is about 25 per cent. higher than the average for that division of Herts—this works out at the high rate of density of *ninety-two* inhabitants per acre. This, there is no gainsaying, represents serious overcrowding, especially in relation to a *Garden* City.

Turning to the paramount and controlling factor of *cost,* it is at once clear that, here again, such abnormally wide thoroughfares are clearly inefficient, if not entirely impracticable. In a paper recently read at the Institution of Surveyors it was pointed out that the mere cost of weeding such great and inadequately used thoroughfares would indeed represent a most formidable item in this relation. It will be interesting here to mention that in the town of Washington, which I feel may be taken as a valuable guide in many matters concerning the laying out of the first Garden City, the item to which

reference is made was found to be so serious that road spaces originally intended for use as such were subsequently laid out as gardens. When we add to this the fact that the initial cost of construction and paving of these unnecessarily wide—from the point of view of traffic—thoroughfares would be enormous, if not prohibitory, in regard to the first Garden City, we see that a compromise must be brought about both as between the Howard plan and the original laying out of the city of Washington.

Having this in view, the reader will observe that I have in the foregoing pages suggested such a compromise to be effected by reducing the width of those portions of the thoroughfares required for the purpose of traction and communication to prudent proportions consistent with perfect freedom and efficiency of locomotion. The effect of this, as will be gleaned from the tables, is that, in my proposal, with a mileage of twenty-three miles of thoroughfares and an average width of 70 feet,—the smallest thoroughfare having the bold width of 60 feet, about the width of Piccadilly—the total area of paved surface, including footways, is only 711,008 square yards, and gives a proportion of seven-tenths to the total street area. Taking the cost of constructing streets at that given by Mr. Howard — viz., £4,000 per mile, which, it should be here pointed out, is totally inadequate for modern street construction—the saving effected

by this method is no less than £27,600 in the City. If, however, we take it that modern up-to-date street construction will be had recourse to—and that such should be the case is beyond the pale of discussion—then the cost per mile of the thoroughfares of the City laid out in the ordinary manner, and in the proportions I have mentioned and shown upon the plan, would amount to £613,264, whereas with the system I have described and advocate* the total cost would be reduced to £395,818. From this it will be seen that a very valuable saving (no less than £217,446) will be effected in the laying out of the City. This reduction, one must not forget, would result concurrently with a beautiful 'garden' effect, such as no town in Great Britain is to-day able in any degree to present to us.

I have now, I trust, dealt sufficiently with road area, public space area, and the proportions these should bear to the privately enclosed areas. I have also dwelt at some length with the most economical and beneficial mode of division of the latter.

The foregoing description of the proposed plan has enabled us gradually to work our way from the centre line of the City—viz., from Grand Promenade —to the inner margin of the agricultural fringe, where we find the smallest houses in the City. These dwellings have apportioned to them the smallest

* Asphalte mastic footways, wood-paved roads, and gravel central promenades.

areas I suggest should be permitted in connection with the City—namely, one-eighth of an acre. They are intended for the housing of such persons as clerks and others who do not wish to indulge in the occupation of gardening to any considerable extent.

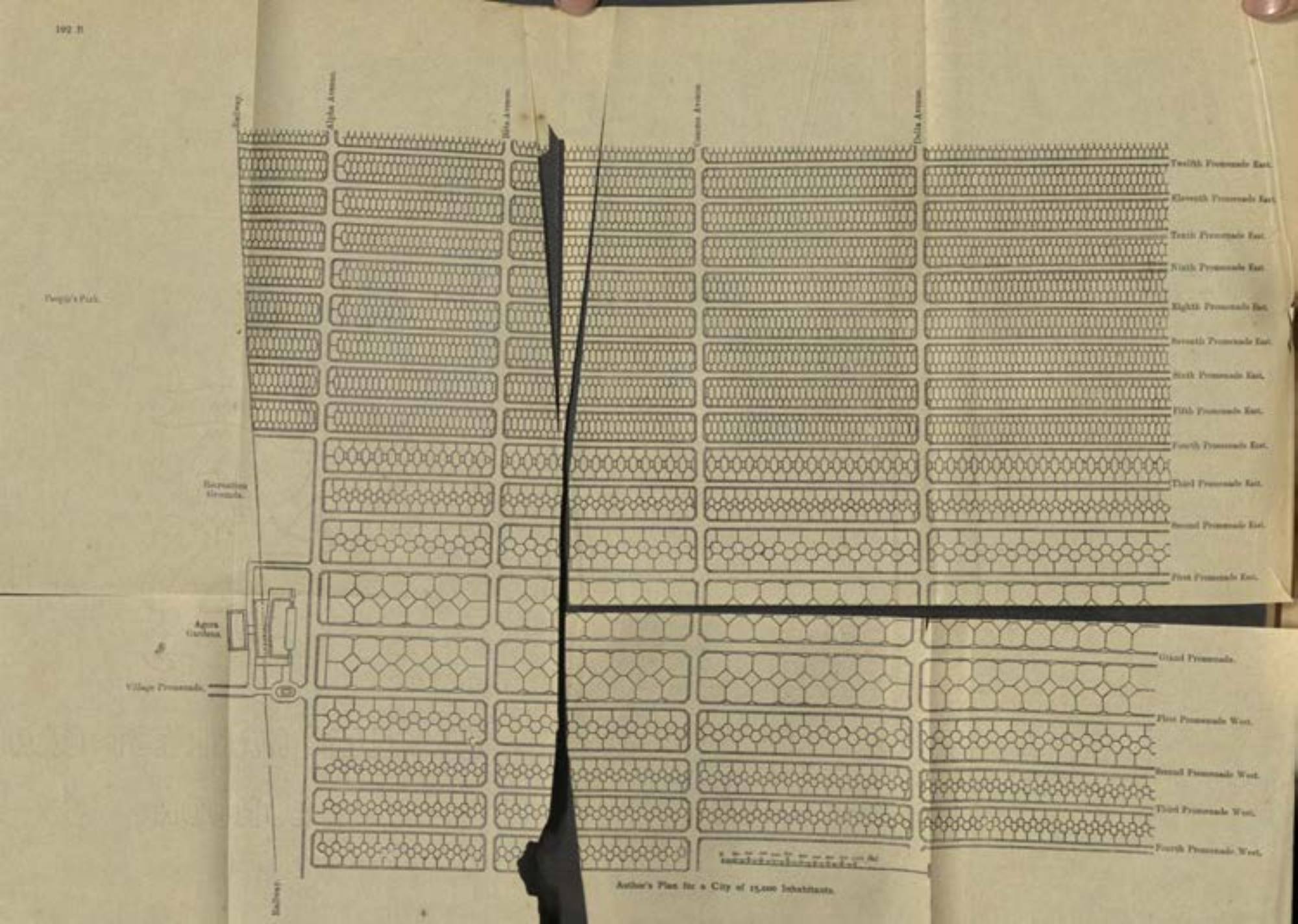
This, therefore, brings us to the consideration of the 'village,' but as this—I venture to feel—receives sufficient attention in the next chapter, nothing further need be said in regard to it here, beyond the statement of the proportion the different areas bear to its total acreage. Thus, to house 10,000 people, some 480 acres have been set apart immediately to the north of the railway-station (the line here passing across the estate in a *quasi* west to east direction). This spot has been chosen because it surrounds a shallow valley particularly well adapted to form the centre line of the 'industrial zone.' The sites of the factories—more fully dealt with in the next chapter — occupy the space of fifty acres; immediately around this industrial zone are the workmen's dwellings, and these extend eastwards up to and beyond, and are delimited southwards by the People's 'Park,' the centrally-placed *Agora* or market *piazza*, and the railway-line respectively. Northwards they are delimited by the northernmost portion of the agricultural fringe, upon the more remote margin of which latter are situated the sewage-farm, the City refuse destructor, and other civic indispensables.

In regard to the village, I have been enabled to reduce the thoroughfare length proportionally to the privately enclosed space, this having been carefully studied for the purpose of reducing the cost of roadway construction, lessening the cost of upkeep, and reducing the frontage mileage, to the end of supplying the inhabitants with the *maximum* of garden space and housing comfort at the *minimum* of *rental*. This I have been enabled to do by discarding the prevailing costly process of giving every cottage a highway frontage, and adopting the peculiar polygonal configuration I have figured and explained in the preceding chapter.

To summarize, it may be mentioned that the City I propose would consist of three separate areas: A, the City proper; B, the village with its industrial zone; and C, the agricultural fringe; and the space allocated to them respectively is as follows:

A. City	822	acres.
B. Village with Industrial Zone ...	528	„
C. Agricultural Fringe	2,450	„

Had the original intention been carried out, the area of the agricultural fringe would have been 4,650 acres. For all practical purposes, however, the surrounding land, owned by others, will serve equally well, and the advantages of industrial and agricultural interweaving be reaped in a similar manner.



Author's Plan for a City of 15,000 Inhabitants.

RÉSUMÉ

It may here be advisable to make a synopsis of the three schemes for model cities referred to, and to facilitate comparison by means of tables embodying the salient points of each. It will be seen that the Howard scheme provides only, for actual dwelling sites, 375·75 acres for 30,000 people; the Buckingham gives 178·76 acres for 10,000; whilst in the one I suggest, allowance is made for 595·71 acres to the 15,220 inhabitants. These ratios give respectively 80, 55, and 25 persons per acre as the density of population of the actual residentially occupied land in each of these three cities, the latter figure being that prescribed by Richardson and Chadwick as the maximum density of population allowable for the City taken as a whole.

In both the Howard* and the Buckingham

* It must be noted in Howard's favour that he takes 115 out of 152·6 acres of his 'Grand Avenue' and turns it into an additional park or ring of vegetation, in which he proposes to

BUCKINGHAM'S PLAN OF A CITY FOR 10,000 INHABITANTS; AREA, 620 ACRES.

Letter on Plan.	Square containing—	Residential Sites.	Commercial Sites.	Factory Sites.	Roads.	Parks.	Public Building.	Width.
		Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Yards.
Y.	Inner square or forum ...	—	—	—	—	—	11·2488	233·33
H.	Central square	18·5950	—	—	3·2139	—	—	83·33
W.	Inner grass lawns*	—	—	—	3·8567	37·4655	—	100·00
G.	Seventh square	30·5215	—	—	6·2093	—	—	66·66
V.	Open grass lawns†	—	—	—	4·6538	27·7153	—	50·00
F.	Sixth square‡	—	—	—	3·1111	20·7640	—	33·33
U.	Street	—	—	—	31·0743	—	—	40·00
E.	Fifth square	40·6630	—	—	4·8833	—	—	53·33
V.	Open grass lawns§	—	—	—	4·6538	42·3158	—	50·00
D.	Fourth square	—	30·4977	—	3·1111	—	—	33·33
U.	Street	—	—	—	42·7547	—	—	40·00
C.	Third square	45·2653	—	—	4·0367	—	—	43·33
V.	Open grass lawns‖	—	—	—	4·6538	56·0900	—	50·00
B.	Second square	—	—	39·5518	3·1111	—	—	33·33
U.	Street	—	—	—	53·9026	—	—	40·00
A.	First or outer square	43·7208	—	—	3·1111	—	—	33·33
	Totals¶	178·7656	30·4977	39·5518	176·3373	184·3506	11·2488	983·30

* In this square we have four fountains, five churches, occupying a total area of 2·9842 acres, besides the Library, University, and place for public meetings, areas of which are not stated.

† In this square we have four dining-halls and four public baths, occupying a total area of 1·1937 acres.

‡ This may be called the winter park.

§ In this square we have four dining-halls, four public baths, four girls' schools, and four boys' schools, occupying a total area of 2·3874 acres.

‖ In this square we have four dining-halls, four public baths, four girls' schools, four boys' schools, and eight infants' schools, occupying a total area of 3·5812 acres.

¶ The total area of land commercially useful is 248·8151 acres = 120·4 square yards per inhabitant.
" " unprofitable to the City is 371·9367 " = 180·0 " " "
A grand total of ... ... 620·7518 " = 300·4 " " "

In this scheme the ratio of profitable to unprofitable area per inhabitant is as 2 is to 3.

schemes it will be observed the amount of road space allowed is exceedingly wasteful, for it amounts almost to unity—that is to say, it nearly equals in area the total amount of land upon which dwelling-houses are collocated. In the proposal I make, on the other hand, the total area of roads is slightly more than *one-third* (as 2 : 5) of the residential area, and from this four valuable advantages accrue: *Firstly*, the *income* of the City is greatly augmented; *secondly*, the expenditure to be incurred in the laying out of the City—in roadway construction, etc.—is very greatly reduced; *thirdly*, the crushing together of the dwellings, so characteristic of the two first-mentioned schemes, is avoided; and each citizen obtains a large garden; and *fourthly*, the cost to the City of maintenance of thoroughfares is also very largely reduced. Put into other words, in the Sennett scheme the space in the two others lavished upon roadways is added to the gardens of the houses, by which means it is made a *Garden City*, as distinct from a City with gardens.

In the Buckingham plan, the factory and workshop area of some 40 acres is obviously too lavish for a population of 10,000, for this would give enough working space for from 7,000 to 8,000 operatives, a number quite disproportionate to a population

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put the churches and schools, presumably charging a rent for the sites, and so obtaining a small income from this source.

HOWARD'S PLAN OF A CITY FOR 30,000 INHABITANTS; AREA, 935 ACRES.

No.	Rings containing—	Residential Sites.	Commercial Sites.	Factory Sites.	Roads.	Parks.	Public Buildings.	Width of Ring.
		Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Yards.
1	Central garden ...	—	—	—	—	5·0000	—	180 diameter.
2	Public buildings...	—	—	—	1·9834	—	3·9862	40 wide.
3	Central park ...	—	—	—	17·3553	121·2256	—	350 ,,
4	Crystal Palace ...	—	17·7905	—	1·4875	—	—	30 ,,
5	Fifth Avenue ...	—	—	—	19·5473	—	—	30 ,,
6	First residential ring	74·9661	—	—	10·9090	—	—	110 ,,
7	Fourth avenue ...	—	—	—	17·1360	—	—	20 ,,
8	Second residential ring	83·5518	—	—	9·9178	—	—	100 ,,
9	Grand avenue* ...	—	—	—	152·6661	—	—	140 ,,
10	Third residential ring	107·2702	—	—	17·3553	—	—	100 ,,
11	Second avenue ...	—	—	—	26·4829	—	—	20 ,,
12	Fourth residential ring	109·9793	—	—	15·6198	—	—	90 ,,
13	First avenue ...	—	—	—	44·2031	—	—	30 ,,
14	Industrial circle ...	—	—	67·5906	8·6776	—	—	50 ,,
	Totals ...	375·7574	17·7905	67·5906	343·3406	126·2256	3·9862	1,290 ,,

* In this Howard proposed that 115 acres should be laid out as a circular belt of park land, with six schools, each with 4 acres of playgrounds.

The total area of land commercially useful = 461·1335 acres = 74·39 square yards per inhabitant.
,, ,, unprofitable to the City = 473·5524 ,, = 76·35 ,, ,,
Grand total in acres = 934·6809 ,, = 150·74 ,, ,,

In this scheme the ratio of profitable to unprofitable area per inhabitant is nearly unity—viz., as 1 is to 1.

of 10,000, even allowing for large open spaces around the workshops, a measure I strongly advocate, but for which Buckingham made no provision ; and taking the same standard of working density—viz., 200 workpeople to the acre—this would still have provided for the employment of a number of workpeople closely approximating to the total population of his city. Buckingham was more lavish than Howard with his parks and other open spaces.

The proposal here made provides for a great length of promenades and large area of public places of resort in the City, with suitable area of recreation-grounds for employers, citizens, and private residents, and in the village a large public park of some 66 acres in extent, in addition to sports grounds ample for the needs of the industrial community, the object again being to provide ample *private garden* space for *every class of citizen* rather than an abnormal expanse of public grounds entailing wasteful expenditure, loss of revenue, and excessive taxation of the whole community in public upkeep.

The ratio of profitable to unprofitable land works out in Howard's City about to unity, in Buckingham's as two is to three, in mine as five is to two, the loss to revenue, initial cost, and cost of maintenance varying, of course, in about like proportion. In Howard's plan 74 square yards per inhabitant of commercially useful area are available

SENNETT'S PLAN OF A CITY FOR 15,000 (WITH VILLAGE, 25,000*) INHABITANTS; AREA, 822 ACRES.

No.	Subdivisions.	Residential Sites.	Commercial Sites.	Factory Sites.	Roads.	Parks.	Public Buildings.	Width of Road.
		Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Yards.
1	Capitol place	3·1680	1·2946	—	—	—	—	—
2	Fifth promenade, west ...	9·1551	—	—	1·0000	14·9036	0·4820	—
3	Fourth ,, ,, ...	27·2864	—	—	11·5702	—	—	26·66
4	Third ,, ,, ...	34·1299	—	—	11·5702	—	—	26·66
5	Second ,, ,, ...	36·8663	—	—	11·5702	—	—	26·66
6	First ,, ,, ...	46·3498	—	—	11·5702	—	0·2548	26·66
7	Grand ,, ...	50·9642	—	—	14·4628	—	0·5096	33·33
8	First ,, east ...	46·3498	—	—	11·5702	—	0·2548	26·66
9	Second ,, ,, ...	36·8663	—	—	11·5702	—	—	26·66
10	Third ,, ,, ...	31·9972	—	—	8·6776	—	—	20·00
11	Fourth ,, ,, ...	31·0582	—	—	9·4490	—	—	20·00
12	Fifth ,, ,, ...	30·1193	—	—	9·4490	—	—	20·00
13	Sixth ,, ,, ...	30·2340	—	—	9·5179	—	—	20·00
14	Seventh ,, ,, ...	30·3489	—	—	9·5179	—	—	20·00
15	Eighth ,, ,, ...	30·4636	—	—	9·5867	—	—	20·00
16	Ninth ,, ,, ...	30·5785	—	—	9·5867	—	—	20·00
17	Tenth ,, ,, ...	30·4636	—	—	9·6556	—	—	20·00
18	Eleventh ,, ,, ...	30·0045	—	—	9·5179	—	—	20·00
19	Twelfth ,, ,, ...	29·3158	—	—	9·2424	—	—	20·00
20	α avenue	—	—	—	6·9421	—	—	20·00
21	β ,, ...	—	—	—	7·9706	—	—	26·66
22	γ ,, ...	—	—	—	7·6951	—	—	26·66
23	δ ,, ...	—	—	—	7·2727	—	—	26·66
		595·7194	1·2946		208·9652	14·9031	1·5012	

* This number of inhabitants has been assumed because the area of the 'First Garden City' is 3,800 acres, as against the proposed area of 6,000 acres.

All thoroughfares running north and south are called 'promenades,' those going east and west 'avenues.' All thoroughfares 'west' of 'grand promenade' have the suffix 'west,' those eastwards of it 'east,' the former being numbered and the latter named by the Greek alphabet. It is easy to locate in the mind the position of every dwelling without reference to any map.]

In this scheme the ratio of profitable to unprofitable area per inhabitant is as 5 is to 2.

as against 76 square yards of unprofitable land; in Buckingham's 120 square yards of profitable to 180 square yards of the unprofitable per inhabitant, and in my proposal 189 square yards of the former to 71 square yards of the latter.

To sum up, I would advert to the great importance of the matters under consideration, for upon the amount of thought and foresight expended will largely depend *for all time*, not only the welfare, but the health and happiness of the inhabitants. Nor is this all, for the apposite division of the land and thoroughfare construction will have material effect upon the rentals at which the dwellings will be obtainable, and which the inhabitants, therefore, will be called upon to pay.

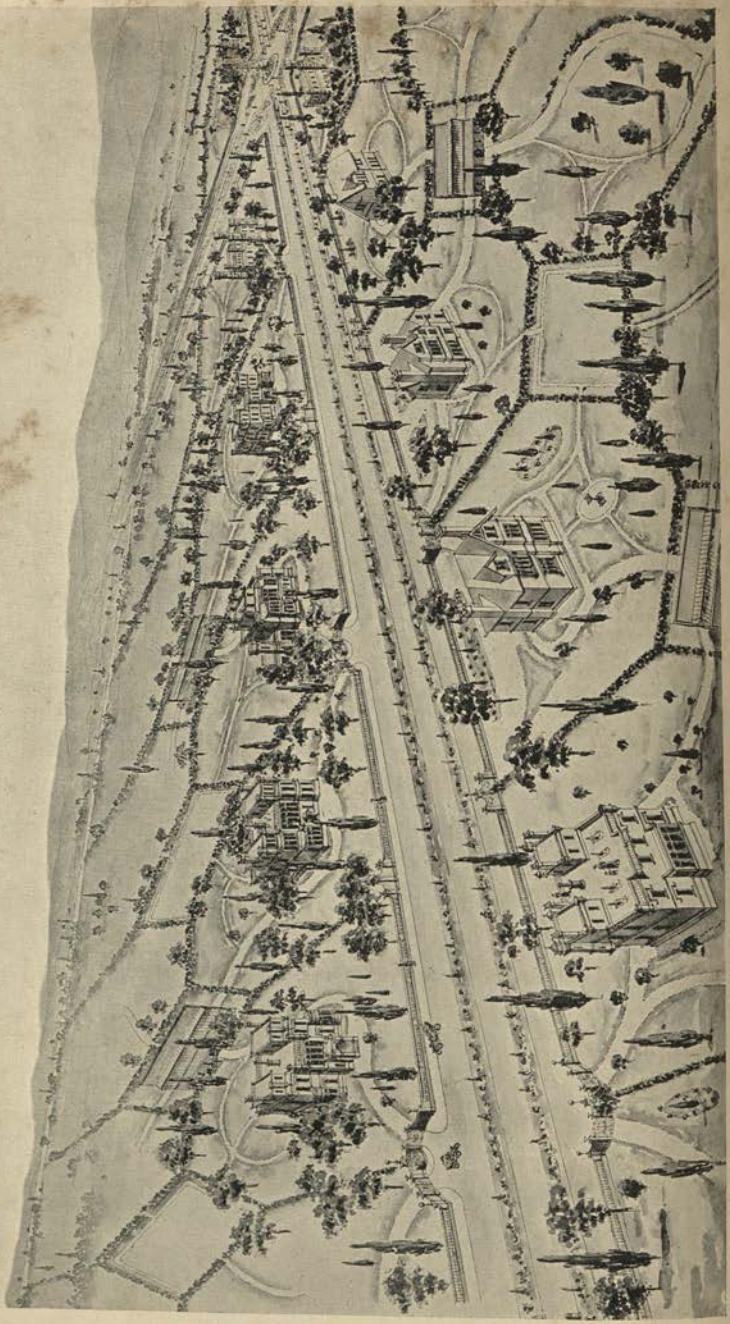
The foregoing dissertation, I trust, may have served to prove there are better ways of obtaining health-giving *space* than by the provision of abnormally large parks or 'collective lungs' and thoroughfares of abnormal and totally unnecessary width. *Primâ facie*, it may look a grand thing to have 'avenues' and 'boulevards' hundreds of feet in width and parks of hundreds of acres, but when their effect is soberly and financially considered, and we find the abnormal in public space entails overcrowding in private, we at once find the idea to be as injudicious as it is hygienically imperfect.

From these, the points of view which alone should be *finally* taken in regard to the covering

of an open space of land by a new town, it is logically imperfect to expand open spaces and to crush together closed dwellings—to, so to speak, leave the open country as we find it in *some parts* of the City and to carry out the overcrowding of towns upon *other parts* of the erstwhile open land.

It is to be remembered that the author of the second scheme for a 'Garden City'—who indeed claims, without reason, to have been the inventor of the name—has been most vehement in his denunciation of both urban land and landlords; that he has preached the truism that in a new City the evils of overcrowding could be averted; whilst he has not omitted to claim sympathy in working upon the feelings by illustrations of overcrowded areas. Yet, so ill-thought-out is his own scheme, that he would commence with a degree of overcrowding not only far in excess of the dictates of science, but greater than that frequently to be met with in our large towns.

More in accord both with logic and hygiene would be efforts made to make 'Garden Cities' '*Cities of Gardens*,' and to show that this is possible and financially attainable has been the object of my inflicting upon the reader the many calculations and arguments contained in this chapter.



Bird's-eye View of the Grand Promenade.

A Walk through the City

Having dealt with the laying out of the proposed City from the individual inhabitant point of view, I will now briefly describe the plan generally. In this relation may I presume to ask leave of my lady-readers to accompany them for a few minutes' 'shopping' in this City of novel design? My excuse is that special arrangements have been made for their comfort in this regard. How often one meets ladies who 'love shopping'! but, despite this, is not *Pluvius* in our own country most ungallant to our fair sisters, mothers, and *fiancées*, and ought not we, mere men—albeit not so enamoured of the pastime—to bestir ourselves and do something to counteract the ill-humour of the besprinkling deity? It would be a great pleasure to me to take them to Mr. Howard's 'Crystal Palace,' but being but a simple terrestrial engineer, tethered to the earth, as it were, by unbreakable ties of feasibility and economy, I find myself unable to soar with him into the far-away realms of impracticability where,

entering constellations studded thickly with ideas—brilliant as they are impracticable—I should find myself enveloped—nay, enmeshed—in the unattainable.

The enormous cost of construction of Mr. Howard's 'Crystal Palace' will assuredly prohibit my readers from ever entering it, whilst the cost of its upkeep*—to say nothing of rental—would

* The 'Crystal Palace' proposed by Mr. Howard would be nearly two miles in length (to be exact, one mile and seven-tenths) and some thirty yards in width. It would therefore cover an area of ground of seventeen and three-quarter acres. The Great Exhibition of all Nations was *eighteen hundred and fifty-one* feet long (thus corresponding to the year in which it was erected), and provided a superficial area of about *seventeen and one-third acres*, or practically the same as that of Mr. Howard's 'Crystal Palace.' This being the fact, the reader, by reflecting upon the cost of Paxton's Palace of Glass, will be able to form his own estimate of the enormous expenditure which would be entailed in carrying out the project, and also to decide whether such a vast edifice would be at all proportionate to a population of some 30,000 inhabitants.

It is pointed out, however, that it would be too large for shopping, pure and simple, and the suggestion is made in reference to the farmers of the agricultural margin that, whilst these 'farmers are hardly likely to supply (the inhabitants) with tea, with coffee, with spices, with tropical fruits, or with sugar,' the latter tropically-produced commodities might be grown in glass houses. Mention is made herein (*vide* Appendix to Chapter VI.) of tea at *sixty shillings a pound*; this record might, I feel, be easily broken by means of the above suggestion. Sugar, of course, might be grown in the tropical department of the 'Crystal Palace,' because there would be found the requisite

equally assuredly prohibit them making a purchase therein.

Buckingham also proposed a crystal palace, but his ideas in this relation were far more practical, and—*except for their magnitude*—such as one would not stigmatize as either extravagant or unlikely of realization. His proposals in this regard were of two kinds : the provision of *piazza* or colonnades consisting of continuous arcaded porticos, upon the top of which the inhabitants might promenade in fine weather and beneath them in wet weather, and the provision of covered arcades, the roofing of which was to be of glass. These were to be of two kinds, and to serve three different purposes. The first—shown at B on the plan—was to consist of a double row of one-story

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height of roof. But to do this on business lines, taking one-half of the area to be utilized in this manner, I calculate that its price would have to be about a guinea a pound to return the minimum profit percentage I have mentioned in regard to British beet-sugar manufacture. It is possible, however, others may not take quite so despondent a view of Commercial Crystal Palaces. It happens, however, that some seven-and-twenty or eight-and-twenty years ago I was a student in the Engineering College of the Crystal Palace at Sydenham, and, if my memory serves me, the cost of repairs at that date sometimes amounted to £1,000 a week. Now, £52,000 a year for the smaller building would mean that the whole of the gross income estimated by Mr. Howard would become absorbed in course of years in the up-keep of the building provided for facilitating shopping. Personally, I do not think it would be worth it.

workshops 40 feet deep, and having frontages of varying widths appropriate to the operations carried on. These were to be built with a passage *twenty feet in width* between them, and this *passage* was to be provided with a glass roof. These *vis-à-vis* rows of shops, thus covered in, would have provided a walk, dry in all weathers, of *nearly three miles and a quarter.*

The rectangle marked D on the plan was to be in every way similar to B, except that it was to be composed of *vis-à-vis* shops for the sale of the commodities manufactured—in other words, a 'shopping' arcade. This would have been *some two and a half miles* in length.

The rectangle marked F on the plan was to be a public promenade, and to be constructed as follows: A central walk, some 40 feet in width, was to be covered with glass, but this roof was to have no sides, its eaves being supported upon continuous colonnades of arcading having a depth, from such arcading to the side walls, of some 30 feet, thus making the total width of covered promenade *one hundred feet.* The walls of this splendid covered arcade were 'to be adorned, as time and improved wealth might admit, as the porticos of the Romans and the Agora of the Greeks, with pictures,' whilst the colonnades were, in like manner, to contain groups of statuary in a manner similar to their arrangement in the *loggia*

of the *Piazza della Signoria* of Florence. The length of this colossal promenade would have been rather more than *one mile and two-thirds.* Thus Buckingham would have obtained no less than *seven and a half* miles of covered ways, with a total area of glass of 22½ acres.

Now, if we turn to the 'Crystal Palace' of Howard, which, it was proposed, should be more than quadruple the width of the arcades of Buckingham, and more than twice that of the glass of his promenade; taking the height of the sides at the moderate figure of 50 feet, and one cannot do less, for even with that height of vertical side it would be an unsightly building—unless such height were to the 'springing' of a circular roof, in which case the areas and costs would have to be greatly increased—we find that the total area of glass would be no less than *thirty-six and one-third* acres for a length of *one mile and three-quarters*, or, compared with Buckingham's proposals, more than one and a half times the expanse of glass for *but one quarter* of the total length of promenade available. Expressed in other words, the original proposal (Buckingham) would have been six times more monetarily efficient than the later (Howard). In the latter case, also, the cost of maintenance would be far more than proportionately increased.

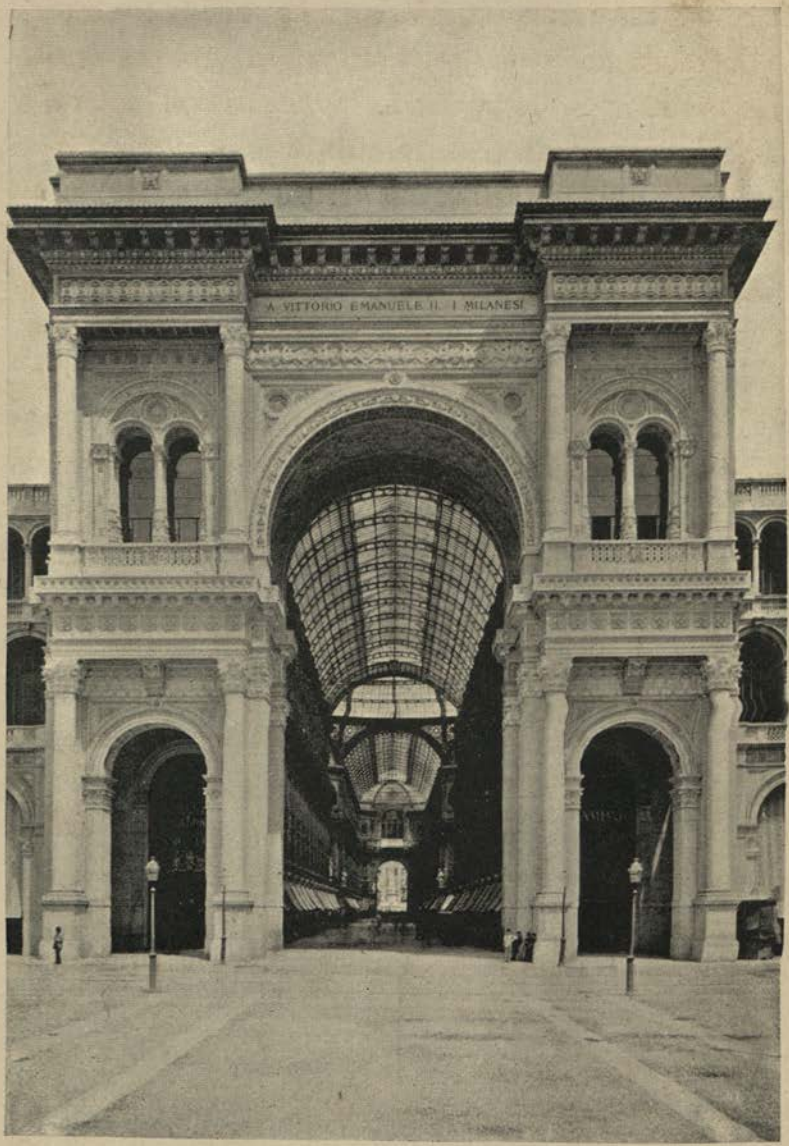
In Buckingham's design, indeed, economy was very carefully studied, for it is obvious that the

walls of shops and workshops cannot be debited against the cost of the roof, any more than it would be fair to debit the cost of an outhanging porch with the cost of the wall of a house supporting it. The only thing one can take exception to is the *purpose* for which Buckingham proposed the most lengthy of his glass-roofed buildings, two of which were to be 'like the Burlington and Lowther Arcades.' Had he confined himself to the one he proposed for the purpose of facilitating 'shopping,' and thus acting as a mitigation of our unfavourable climate—supplemented, it might be, 'as time and improved wealth might admit,' with the Agora for pleasure—in plain words, had he put it forward for the dual purpose of a convenience to the ladies and a means of facilitating and increasing the business of the shopkeepers patronized by them, then, I contend, not only would such have constituted a grand public expedient, but also money very judiciously invested.

This I shall hope to show by a short and simple calculation. But before doing this, I would ask the reader to think over if an arcade is a very desirable thing; or, rather I ought to ask, if *arcades such as we know them in this country* are desirable things. There can, I think, be no question as to the reply were we considering such arcades as the one at Milan (see illustration), the roof of which—very wisely—is supported, *not* at the height of the

The Burlington Arcade, London, early Victorian Era.

206 A



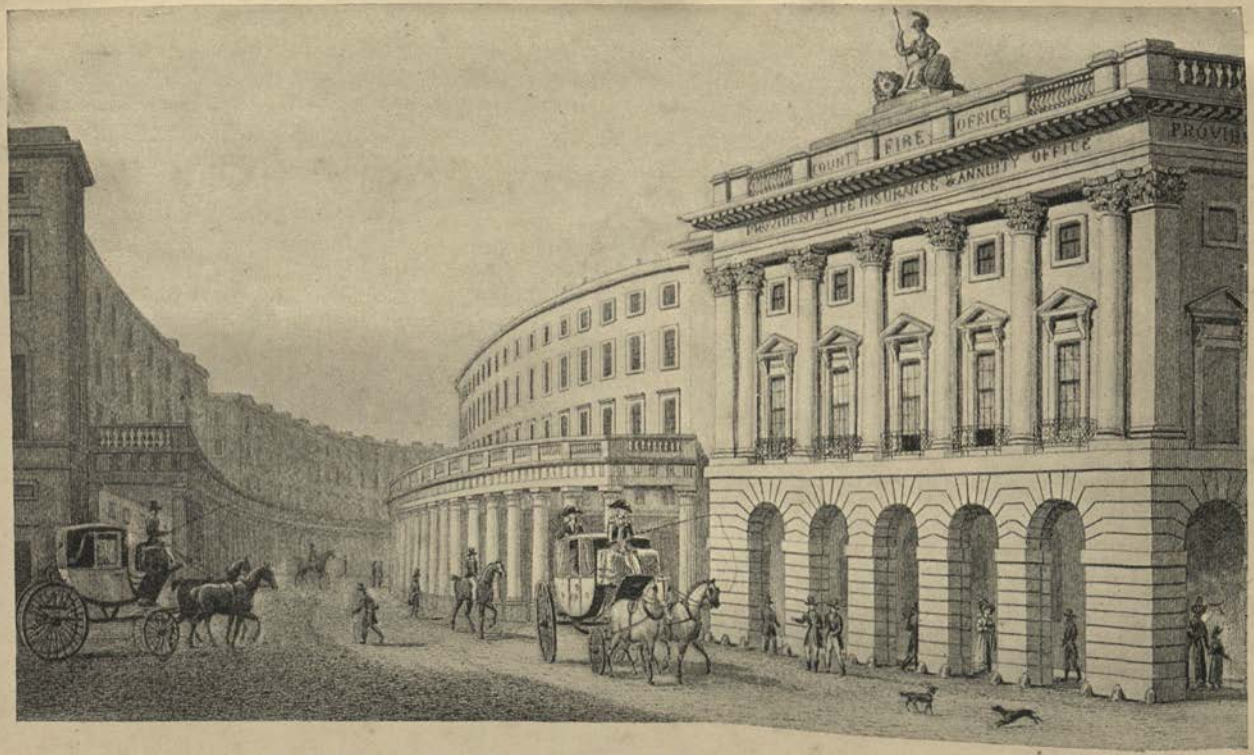
The Arcade at Milan.

facia boards of the shops, but at the *height of the roofs of the adjacent buildings.* By this common-sense arrangement we—*without any additional expense*—obtain a lofty and imposing structure, *efficient lighting*, and free circulation of air. We in England, unfortunately, have not the enterprise to carry out any such imposing conceptions, despite the fact that the increase of expenditure would be quite negligible, and hence we content ourselves with a miserably meagre alley-way ceiled with glass. I am afraid the reader will say with me that, having regard to the inefficient manner in which the wares displayed in the shopkeepers' windows are lighted, the congestion and 'stuffiness' of such enclosures, and their depressing and insanitary conditions, they — the British arcades —are *not* desirable things. Such an arcade as the *Galleria Vittorio Emmanuele* of Milan, which is presented in one of the illustrations, is free from these reproaches, fosters trade by creating a fashionable *rendezvous*, permits of pedestrian exercise during inclement weather, and, indeed, forms a *cheap and efficient concert-hall* during wet weather, for than beneath its very lofty glass canopy the fine military orchestras of the Italians are never heard to better advantage.

Economy and compromise, however, must be my watchwords. I will therefore confine myself to advocating an economical, though thoroughly

efficient, convenient, and healthy, substitute—I refer to the use of continuous and symmetrical colonnades, open at the sides opposite to those formed by the shops they are intended to serve.

I have already mentioned the bold effect produced by uniformity and continuity of architecture of shop façades, as evidenced by London's most imposing 'shopping' thoroughfare—Regent Street. The able architect, however, was in his day unable to produce the good results now open to us in regard to the 'shopping' division of Garden City, by reason of several *insurmountable* circumstances. In the first place, he was *obliged* to build a certain length of his façades upon a sharp curve; secondly, light and graceful lace-like ironwork was not then at his command; thirdly, the *genre* of the architectural style and taste of the period was in itself *heavy*. Happily, I am enabled to present to the reader two excellent reproductions of steel-plate engravings prepared at the period. These demonstrate and corroborate most conclusively my contention that curved thoroughfares must of necessity produce a confined and 'closed-in' aspect, no matter how bold their architecture. For it must not be forgotten that the 'sweep' of Regent's Quadrant is a bold one, being set out with a radius of 520 feet, thus being endued with a curvature equivalent to that of a circular road nearly one mile and three-quarters in length. From the



The 'Quadrant' in Regent Street, showing the 'Closed-in' Aspect.

Regent's Quadrant, showing Nash's Doric Columns.

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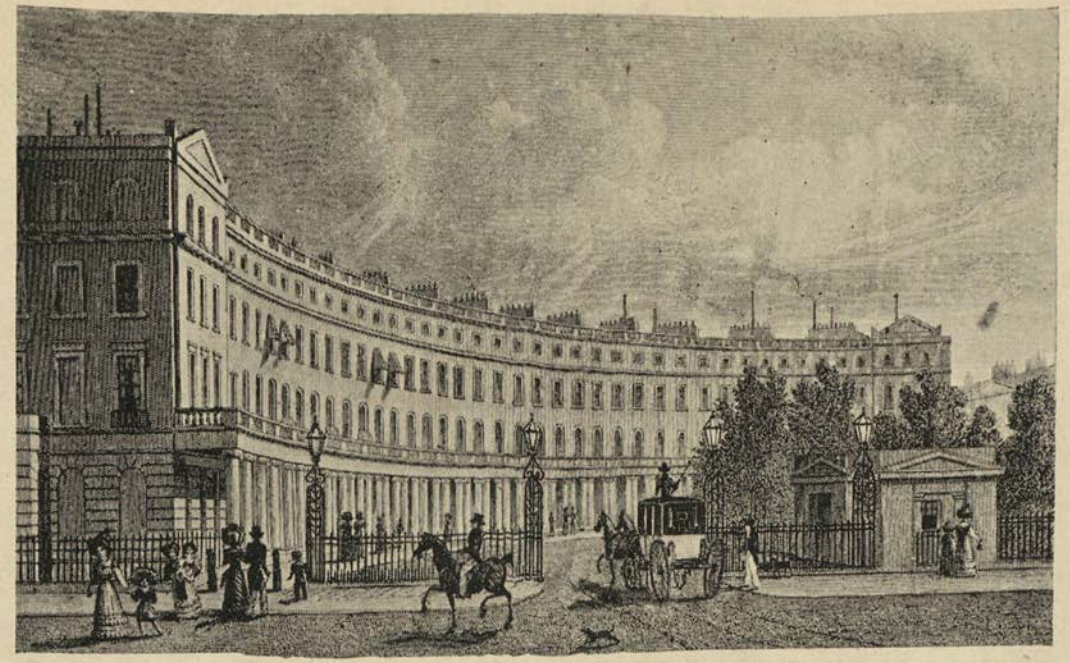
engravings it will be seen that Nash embellished his 'Quadrant' with an imposing, albeit massy, colonnade in the Doric style of architecture, with plinths, bases, and flutes. In this he exhibited much forethought and ingenuity. Having regard to the number and uniformity of his columns, he effected great economy in regard to them by preparing a mould and casting them in iron, instead of going to the immense expense of having their flutes all sculptured in stone. The entablature supported by them and the balustrading carried by this again were of Bath stone, the facings of the upper elevations being of 'patent mastic'—a species of oil-cement that able architect was instrumental in bringing into use. To obscure as little as possible the light of the shop-windows, the portico, as will be seen, was very lofty, being, indeed, placed at such height as to permit of a *mezzanine* story being inserted between the continuous facia and the ceiling of the colonnade. To permit of this, the iron columns—of which there were 270—were no less than 16 feet in height, exclusive of their granite plinths, whilst to bring them into correct proportionment with the continuous entablature they had necessarily to be of great girth. Despite the loftiness of the design, the darkness resulting from the continuous portico, built as it was with an opaque ceiling and edged with numerous columns of considerable diameter,

had the result of eventually bringing about its demolition, for it was removed in 1848, after lending embellishment to the noble thoroughfare for scarcely half a century. Had the majestic colonnades of Nash been provided with glass ceilings, there is little doubt our fair sisters would have been seen shopping beneath them to-day.

A recrudescence of colonnade building is now visibly taking effect, this being confined principally to rising places of pleasure resort and to our more northerly-situated towns. Perhaps the most extensively colonnaded of these is Southport, in Lancashire, a rising seaside resort—an efficient 'lung' for the busy merchants of Liverpool and Manchester—one, moreover, in regard to which, it is averred, that of all our towns, it approaches most nearly to a 'Garden City.'*

A colonnade, to produce a pleasing vista, *must* fulfil the requirements of art in regard to uniform and regular repetition. It is not a matter in which a delightful higgledy-piggledyness of units will produce a delightful whole. In one of the illustrations is given a view of the boldest thorough-

* The hospitable inhabitants of this town evinced the liveliest interest in the subject with which we are now dealing when brought before it at the last meeting of the British Association of Science, and now we learn a 'Garden City' has been plotted out, and is being actively pushed forward at a spot a short distance southwards of Southport, to which it will be connected both by rail and electric tramway.



A Curved Terrace—Georgian Era.

A Bold Street with a Discontinuous Colonnade—Southport.

fare in Southport—Lord Street. It is 105 feet in width. Between the buildings it varies from 183 feet to 248 feet,* and is profusely planted with trees, whilst the shop verandas or porticos go towards producing a continuous colonnade, beneath which 'dry' walks in wet weather can be obtained here and there for some distance. The general effect, it will be seen, is marred by lack of uniformity in regard to these porticos.

In the next chapter will be found references to the shops of a Garden City, and, from considerations of things to obtain, I advocate the erection of 'lock-up' shops—a form becoming more and more general in our country. Reference is also made to the introduction, now taking place in London and elsewhere, of 'double-tier' shops. I therefore advocate, as a compromise between colossal 'Crystal Palaces' and miles-long arcades, the building of a quadrangle of 'double-tier' shops around one of the '*Garden squares*' of the City, all protected by a continuous 'colonnade.'

For the especial behoof of the ladies—incidentally for the benefit of the tradesmen—I have so arranged this colonnade—the word may conveniently be made to do duty in indicating its locality as well as the thing (see illustration)—that

* Shopfronts to curb, 40 feet; carriage-way, 45 feet 6 inches; footpath (south), 20 feet; shrubbery (belonging to the Corporation), 8 feet; house gardens, 70 feet to 135 feet.

from the moment of their alighting, be it from tramway-car, from motor omnibus, electric victoria, carriage and pair, or the modest and *utile* governess-car, beneath a spacious roof forming the front of the 'passenger' railway-station,* they would be able to complete their shopping—as they now do at the 'Army and Navy' or the 'Civil Service'—*without once setting foot upon a damp pavement.* This remark applies not only to 'finery' and 'comes-

* The suggestion has been made that this might also be the 'goods' station, and from the same point might diverge the requisite 'sidings.' How foolish and short-sighted a course subsequent development would prove this to be, may be gleaned from two facts alone: Firstly, this portion of the City would be the most valuable area both intrinsically and commercially; secondly, the author of the proposal appears to have been quite incapable of any adequate conception of the space of land the goods sidings will of necessity absorb. To convey this to the reader's mind, and to endeavour to do so to what the author of the suggestion would call *his*, I have merely to mention—through the courtesy of the chief engineer of the Great Northern Railway—that at the neighbouring town of Hitchin, essentially non-manufacturing, and having a population of only 10,252, the sidings there extend southwards, from the centre of the passenger platform, a *third of a mile*, whilst northwards they run for *over half a mile*. The space occupied by the shunting yard is no less than *twenty-eight and a quarter acres*. Thus it will be seen that at least *fifty* or *sixty* acres of the centre of the City would eventually become a shunting yard; the manufacturers even then would be most inadequately and inefficiently dealt with as regards transport, whilst the inhabitants of the best parts of the City would be disturbed throughout the night by the noise of the incessant shunting operations.

Shops in Regent Street—Early Victorian Era.

tibles,' but to '*Garden City produce*' displayed *freshly every morning* in the City meat and vegetable markets.

Will a lady reader kindly allow me to accompany her upon what to her would be quite an ordinary morning's occupation and shopping round—to me a pleasant change—and permit me at the same time to relate 'how it's done'? It is 10.30 a.m. —pouring in torrents *as usual*—the electric carriage has just returned from taking her husband to his works. The carriage—closed—is standing 'in the dry' beneath the *porte cochère* of her house, let us say at **A**. Proceeding up Grand Promenade, the coachman, horseless and whipless, drives rapidly to the Agora, entering the vegetable market by its western archway, and bringing his *landaulette* to a standstill under its broad and lofty roof of glass, and immediately in front of the stall she is in the habit of choosing her fresh vegetables from. Greeting the good old lady who presides, and who, it should be mentioned, is equally comfortable, for her stall—heaped with fresh vegetables reared upon the *market-garden fringe*, and brought hither just before by the 'market-gardeners' co-operative motor-waggon'—is situated at the back-door of her dwelling; my companion, without alighting from her carriage, chooses what she wishes, informing me the while she has a good deal to do in a short time, for, apart from ordering 'things' for

dinner, she has to meet a friend by the London express, which will glide into the station 'on the stroke' of 11.53, and give them both ample time to be in their places at the opening lecture of the Art School at noon. I cannot remember a tithe of the things she said she must purchase, the commissions she must attend to for one or two friends less favourably placed, who had 'spoken through' to her per telephone; but it included looking up some matter in the reference library, changing books in the lending library, attending her lecture, and winding up by all meeting at the 'Colonnade Hotel' at 1.5 sharp, all of which she could do *under cover*.

A few electrically-propelled turns of the wheels of the *landaulette*, and my fair companion was talking to her butcher about meat—in a manner which to me appeared nothing short of learned—and then, passing out of the 'eastern' archway of the combined markets, the carriage wheeled round under another and similarly lofty glazed roof connecting the market with the railway-station. Here, stepping out and across to the head of the 'down' stairway, my companion breaks out into a merry little laugh as she encounters her friend and fellow-student, carefully buttoning up her mackintosh, and then, with most serious countenance, struggling to open her umbrella. The laughter now comes from the stranger, when it is explained that she need never

bring either waterproof or umbrella to Garden City.

Continuing across the railway by the level bridge, which is built beneath the station roof,* the two companions find themselves beneath the pleasant colonnade. A pleasant enough place for we mere men, to them 'a paradise,' by reason, doubtless, of the lovely flower-beds in the square, the soft green turf which slopes away from the light balustrading at the edge of the mosaic pavement ofthe long terraces, raised, as they are, some 5 or 6 feet above the general level of the *Colonnade Gardens*, looking so bright and smelling so deliciously sweet after the sharp shower now ceasing, but also by reason of the presence of 'the shops.' Here my companions leave me at the door of the Art School, they turning to the left to the lecture and class rooms, there to partake of enjoyable and elevating study, whilst I—turning to the right from beneath a neat little cupola—enter the Art Galleries, to be likewise pleasurably elevated by the study of the works of others.† An hour would have proved all too short to thoroughly appreciate the merits of the works of art and *virtu* which were there displayed, some by purchase of the committee, some by loan from owners, others, pictures, sculp-

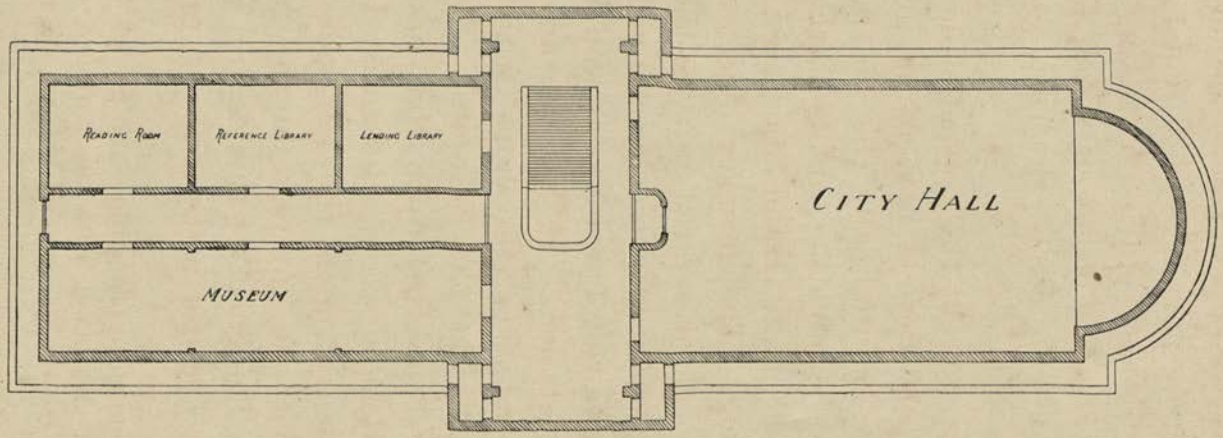
* As in the case of Birmingham, for example.

† Further details of the 'Colonnade' will be found in the next Chapter.

tures, and carvings by the civic students. Moreover, I had promised myself a 'look in' at the Reference Library, but hesitated to leave my cover, for a renewal of vigorous pattering upon the skylight* told of the inclemency without; and I had quite forgotten I was in a Garden City, in which it matters not whether one wishes to go to the Library, to explore the Museum, attend the organ recitals in the Town Hall—a delightful hour's entertainment available every afternoon—visit the Town Clerk or consult the Civic Engineer, all can be done without going for an instant into the wet, for all places of public resort are connected by covered colonnades and piazza, and *all* are close at hand.

On recalling this fact, however, I immediately sallied forth, and asked my way of a genial-visaged and venerable attendant in the vestibule. I observed that he wore a neat uniform of black, with some little red about it, and had a number of medals upon his breast. I also noted that he saluted me with his left hand, because he had no right—I mean hand, the reason, as I subsequently learned, being that in Garden Cities *all* such positions *must* be given to old Naval or Army men, which I thought a very good way of providing berths for men who had faithfully served their country. This official—obviously an 'old salt'—

* By the employment of a kind of canopy the skylight was invisible, but the pictures were amply illuminated by daylight.



Plan of the Capitol, showing the Combination.

told me to simply follow the 'Coleenade' and go over the 'puntee realtee,' the last portion of his direction puzzling me much until I found myself crossing a covered bridge bearing a striking resemblance to the *Ponte Rialto*, two of which are used to connect the '*Capitol*' with the east and west wings of the '*Colonnade*.'

Descending the steps at the opposite side of the bridge, I found they formed part of an imposing corridor bisecting longitudinally the west wing of the 'Capitol,' and terminating, at its farther end, in the 'Great Hall' and 'Grand Staircase' of that *multi-utile* building. The primary object of this ornate bridge is to afford covered entry to the Capitol whilst leaving means of vehicular and pedestrian access to the 'Colonnade Gardens,' as well as *exit** from the railway-station. It has the advantage, moreover, that it connects 'the shops' with all that is public in regard to the 'Capitol.' Visitors, on entering, find themselves upon the 'first floor,' where are the Reading-room, Reference Library, and Lending Library, upon the left side of the corridor by which one enters, and the Museum upon the right. The effect of this central corridor is very pleasing, because it terminates interiorly

* This would be limited to pedestrians and private carriages, the cab and luggage exit being, with the entrance, upon the northern side of the railway-station and beneath the roofing of the covered 'station yard.'

upon the *balcony* of the 'Great Hall,' whilst if it be followed round, by means of this balcony, the visitor can emerge upon either the north or south (exterior) balconies, the former overlooking the '*Colonnade Gardens*,' the latter affording a fine view down the whole length of 'Grand Promenade,' its centre being carefully made coincident with the City's 'show' thoroughfare. Looking out from this balcony upon the '*Colonnade*,' one sees a beautifully laid-out garden, with a dripping fountain and circular basin at the centre, the 'gold'-fish in which are distinctly visible as their bright red and shining bodies glint in their gambols after bread thrown to them by the children.

The Colonnade Gardens, it will be observed, are entirely enclosed on all sides. On the south by the lofty Capitol, on the balcony of which we now stand; east and west by the Colonnaded shops, forming the quadrangle; and northwards by the façades of the railway-station, the hotel, and other buildings. Thus it becomes a very pleasant *rendezvous*, enlivened by fountain and flowers, and the shop-front displays. In addition—and this is also to be appreciated—they are *sheltered* gardens, screened from the wind in every quarter.

Continuing our walk upon this balcony, running as it does along the outside of the Town Hall, we are led—by crossing the covered and ornate bridge, counterpart of the one we have already crossed—

to the 'Winter Garden,' a light and graceful building so constructed as to play the part of Concert Hall, wherein on bad-weather days the band finds shelter—though usually it is to be heard in the Colonnade Gardens in the morning—a time of day when the 'shopping' must be got through, which in Garden City can be done to the pleasant accompaniment of music, just as our peregrination in 'taking the waters' at 'spas' and health resorts is enlivened—and in the Capitol Gardens during the afternoon.

On the eastern side of the spacious Winter Garden we find lawns arranged in terraces upon the land, which slopes away somewhat rapidly in that direction. These lawns are playgrounds of the better-to-do, and are used for tennis, bowls, croquet, and the like, whilst there is an expanse of soft, well-kept turf used for sports requiring greater space, such as archery. Golf, a splendid form of exercise, is provided for on the *outskirts* of the City, the first 'tee' being made from the lawn of the 'Hydro.' Having watched the players, we may return by that portion of the balcony passing along the south façade of the Capitol.

From the Southern Balcony we see the whole of the extensive 'Capitol Gardens,' with their great lawn, like a green velvet coverlet, intersected by the 'high-level' lake, in the middle of which is the Ceramic Kiosque, at the moment playing the part of fountain. The water from this 'high-level'

basin, instead of being led away by pipes, tumbles over a series of rustic cascades situated to the east —the lie of the land being such as to permit of this—and by this pretty means regains the streamlet which originally brought it. The stream carries the used water back into the Park Lakes, from whence it is again raised, to reappear in the fountain in 'Colonnade Gardens,' in 'Capitol Gardens,' and in 'Central Circus.' From these also it passes back into the mother stream, which we find meandering along in a dell o'ershaded by some fine elm-trees, which the budding 'Sir Joseph Paxton' will have carefully preserved; and with the completion of this water-way circuit I seem also to have completed my round in the proposed City.

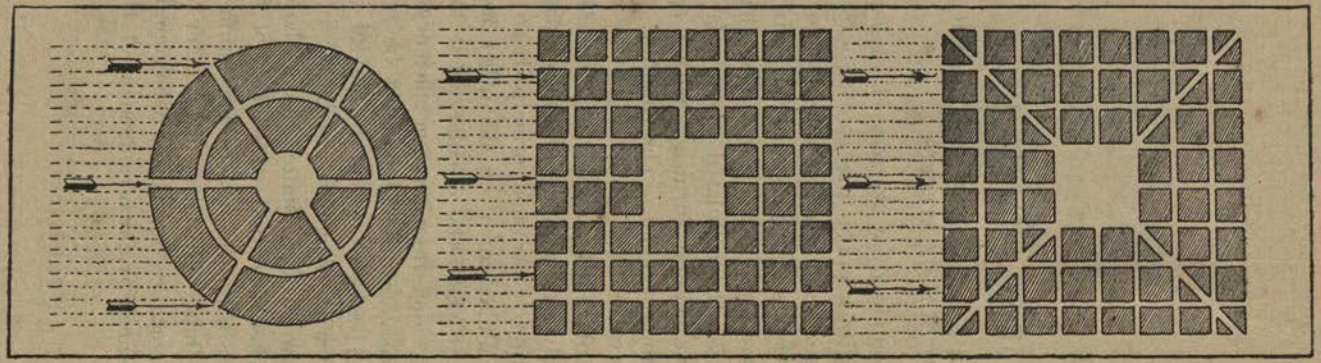
NOTE.—In putting forward my proposal I have kept in mind the sanitary proposals so carefully thought out in regard to the ideal City of 'Hygeia.' It may therefore be advisable to state that this was to consist of 20,000 houses built upon 4,000 acres and providing for a population of 100,000. The area of privately enclosed land was such, and so arranged, as to leave room for three wide main streets, or boulevards, running from east to west, and which would constitute the main thoroughfares. Beneath the surface of each was to have been a railway, along which the heavy traffic would have been transported. The streets from north to south would have crossed the main thoroughfares *at right angles*, and the minor streets, which would also have *run parallel* with the bolder streets or boulevards, would also have been wide, and, owing to the lowness of the houses, well ventilated, and in the daytime 'filled with sunlight.' The accumulation of mud and dirt was to be washed away every day through side openings in the 'subways,' and conveyed with the sewage to a distance apart from the City.

APPENDIX TO CHAPTER III.

NOTE ON THE EFFECT UPON NATURAL VENTILATION OF THE DIRECTION OF STREETS.

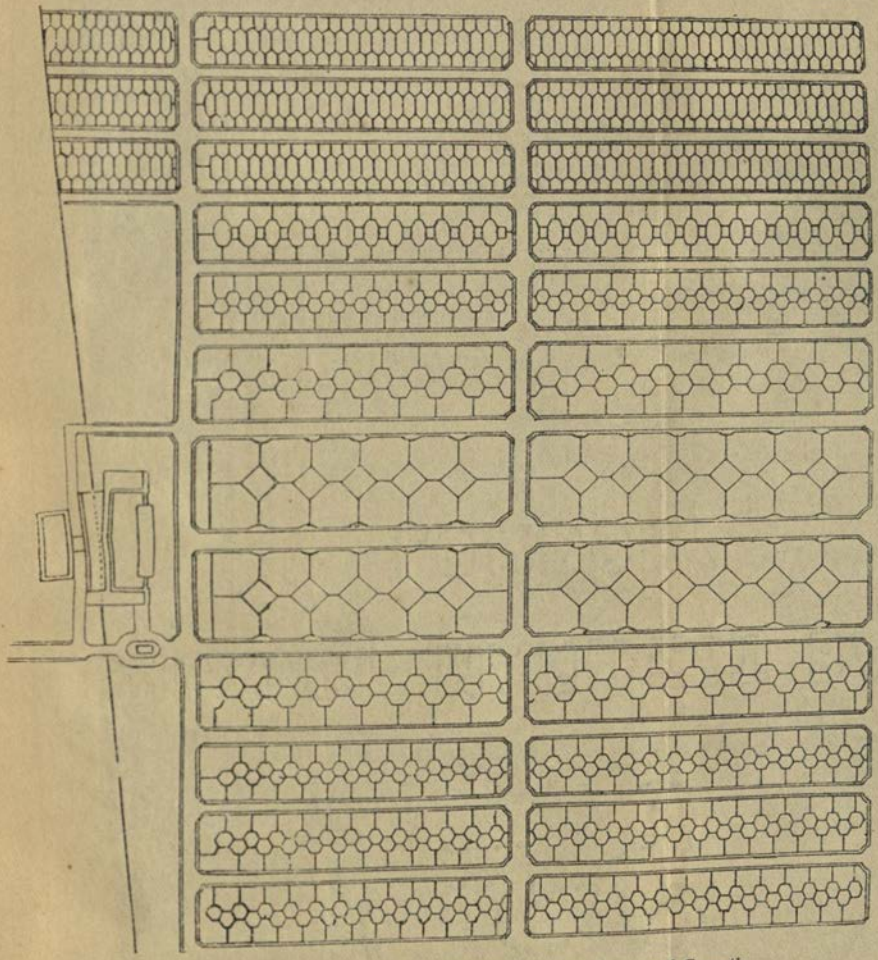
In the case of towns composed of terraces, or streets of continuous buildings, the direction of the streets, especially in relation to that of the prevailing wind, is a matter of some importance. Of the three types of towns referred to in the foregoing chapter, the circular form is the worst from the point of view of natural ventilation; the cellulated town is far superior to the circular, whilst the cellular furnished with diagonals is, again, somewhat of an improvement. The diagrams upon the next page will make this clear.

In regard to the circular design, a direct '*blow through*' is obtainable *in one street* only for six points of the compass. Even in that case the ventilation is confined principally to a central part of the town. A cellular town, on the other hand, is as many times more efficient than the circular, as it has streets traversing it from side to side; its maximum efficiency being for four points of the compass. Moreover, it must be noted that the direct 'blow through' acts from end to end of the town. Cellular towns furnished with diagonals are better, in so far as they provide a direct blow through, limited to one thoroughfare, of maximum efficiency when the wind is at either of four additional points, intermediate with the four of maximum efficiency in regard to the plain cellular. In cities of ordinary type such matters are of much importance, for it has been found that the rate of mortality is influenced by the arrangement of the streets of houses.



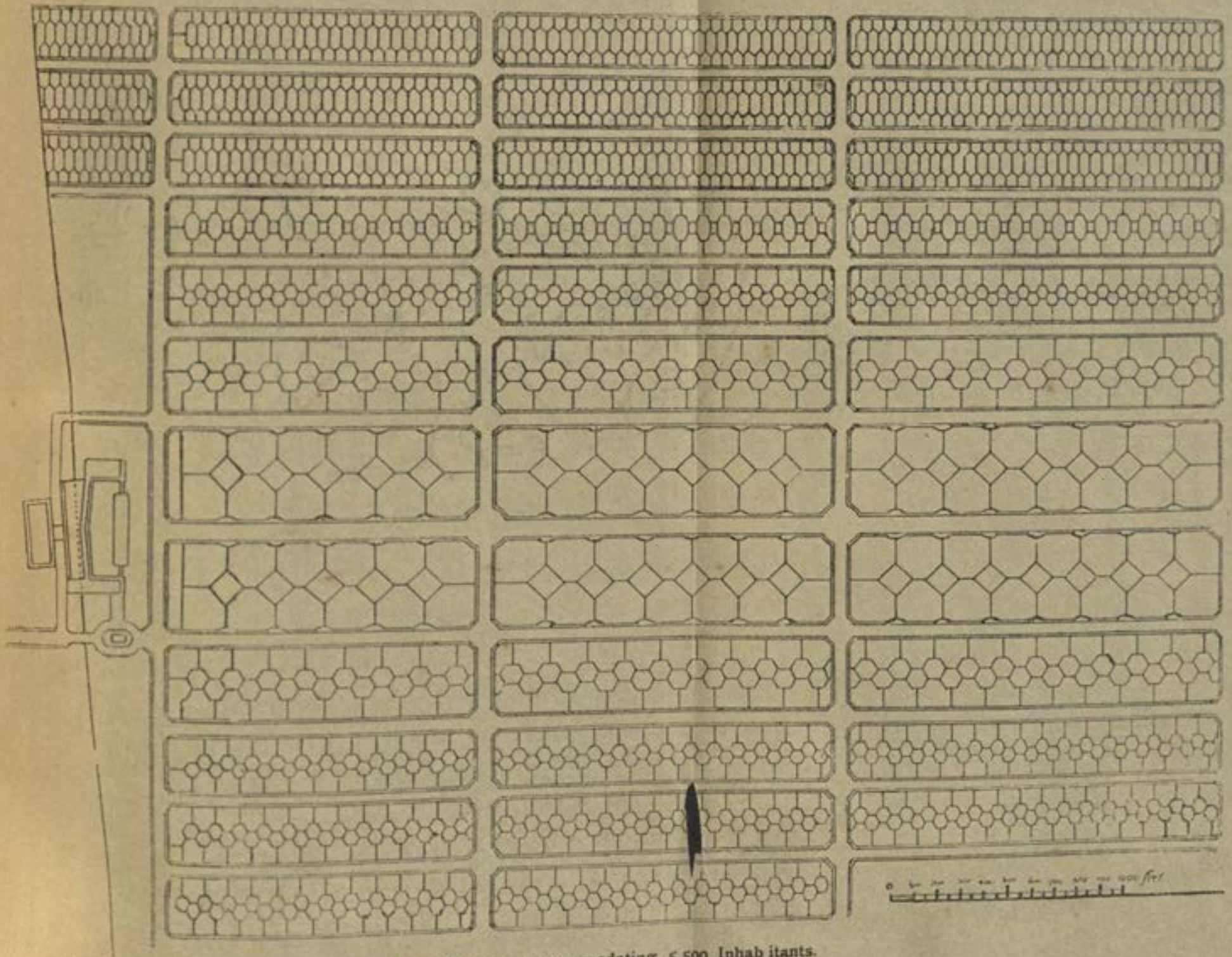
CIRCULAR TOWN. CELLULAR TOWN. CELLULAR TOWN WITH DIAGONAL THOROUGHFARES.

Diagram showing the efficiency of towns as regards wind ventilation, placed in their inverse order of merit. The cellular is infinitely superior to the circular, whilst the addition of diagonals slightly increases the efficiency, but not to a degree at all commensurate with its structural disadvantages and wastage of land entailed.

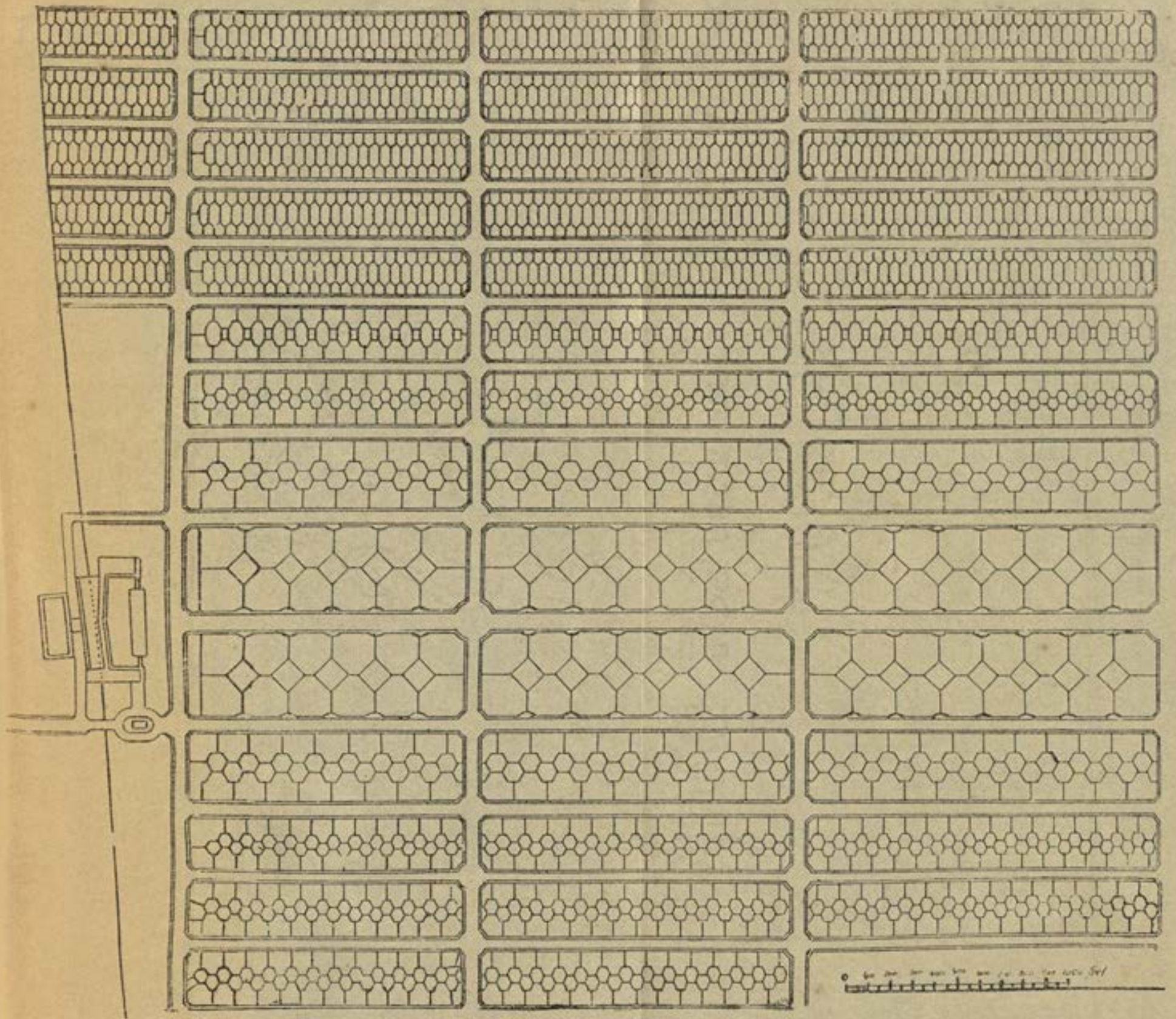


Plans showing Appearance of the City at Different Stages of Growth.

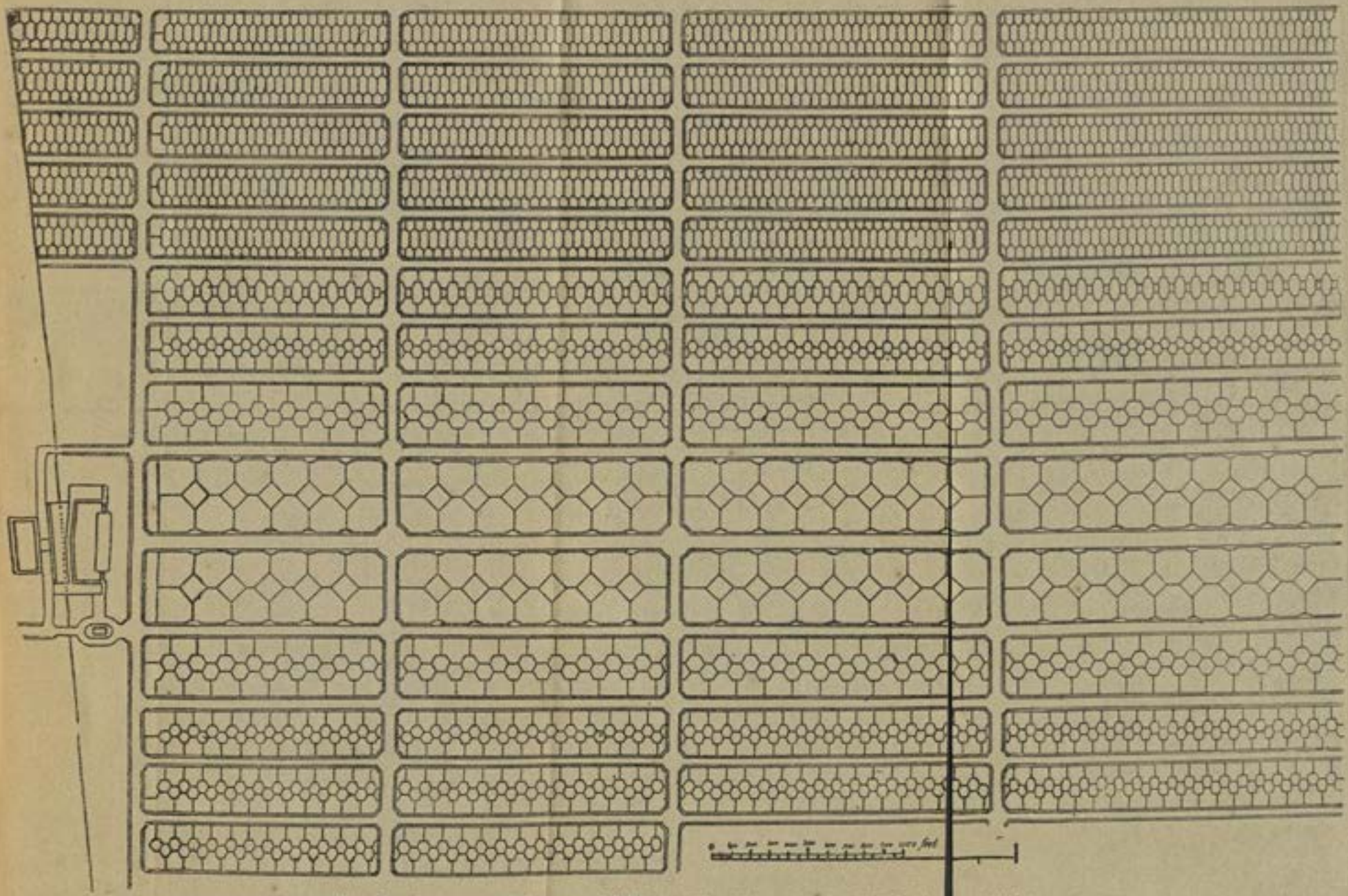
(This stage (A) shows it when accommodating 3,500 inhabitants.)



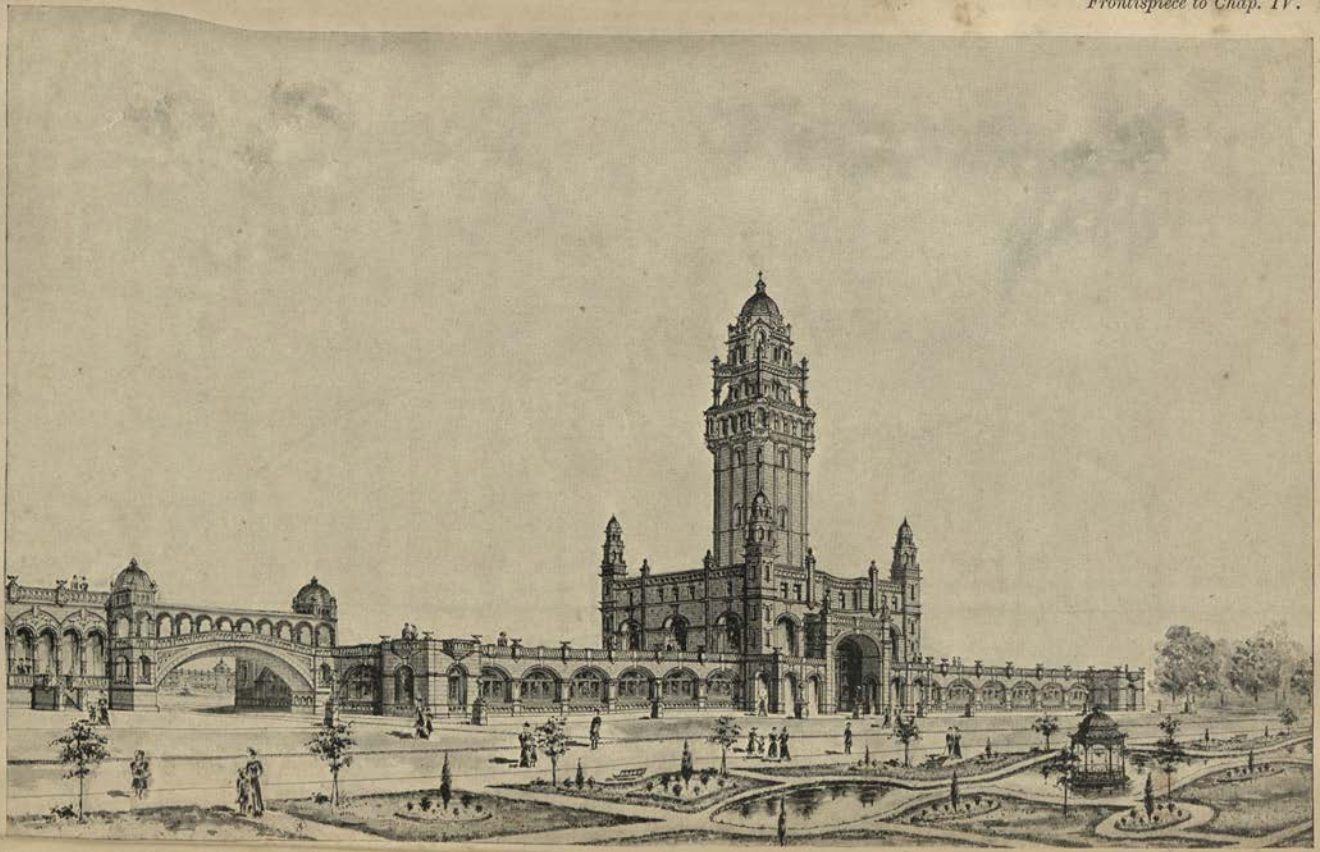
Stage B, when accommodating 5,500 Inhab itants.



Stage C, when accommodating 7,000 Inhabitants.



Stage D, when accommodating 11,500 Inhabitants. (Plan of the complete City will be found on page 192 B.)



Second Stage in the Development of the 'Capitol' during the Inception of the City.

PLATE V.

CHAPTER IV

GARDEN CITY DWELLINGS AND OTHER BUILDINGS

'The Englishman's house is his castle.'

Im hause muss beginnen was leuchten soll in Vaterland.
OLD SWISS MOTTO (1797).

VIEWED from its financial aspect, the building of a Garden Village is a more difficult problem than that of a Garden City. This arises from the fact that a point in social economics presents itself in regard to the Village which is *quasi* non-existent in regard to the City, for, in the latter, the rent-earning capacity of the dwellings may be adjusted so as to produce fair and proper return, proportionate to capital expenditure, by making the rental proportionate to the sumptuousness and comfort-affording capacity of the habitations. The problem to be attacked—and it is indeed a *vexata quæstio*—is how to provide our operatives with dwellings replete with that degree of comfort we would desire them to have, and yet so to arrange matters that

this shall be carried out on interest-returning and hence mercantile lines.

Is the problem more easy or more difficult of solution in a Garden Village than in a town? It should be more easy because of the lesser value of the land. The problem, however, is rendered the more difficult because the very nature of the Garden City proposal is against the agglomeration of workmen's tenements into blocks of buildings, such as have been shown—by such authorities and pioneers as Sir Sydney Waterlow, Peabody, and others—to be the most promising mode of solution in towns. I feel, therefore, it might prove of some utility to lightly consider the question in its more or less mathematical aspect, leaving the architects to fill in the material requirements.

In this relation we have, fortunately, two very fine examples of Garden Villages to point to—I refer to Bourneville and Port Sunlight, these being particularly *apropos* in exemplification, for one is interest-returning,* and hence mercantile and commercially reproducible, the other, whilst being of the greatest interest from the points of view of architectural and sociological results, is unremunerative, and hence inadmissible into the scheme we are now considering. I will first consider the economic

* Although the land, in the instance of Bourneville, was a gift by Mr. George Cadbury, in arranging the rentals suchwise that a return of 4 per cent. shall be derived, interest is set aside in respect to the land as if it had been purchased.

use of the land and its subdivision in regard to length of roadways, touching afterwards upon such points as its relation to the nature of the dwellings, and the economic effects of detached, semi-detached, multi-tenanted buildings, and 'blocks,' in relation to their cost of construction, as also in relation to the land area set apart for the Village.

I have elsewhere referred to the great desirability of the workman's dwelling being *directly upon the site of his garden*, in opposition to the provision of more or less remote 'allotments.' I make these remarks, therefore, on the assumption that the residences, cottages, and tenements of Garden City and Garden Village alike are to be individually surrounded by the gardens *allotted to each.*

This is a point I would desire most forcibly to press home, because, as I have striven to prove,* the advantages accruing from the 'Allotments' Act are of the few things, out of the many, devised for the benefit of the working-man of which he has taken due advantage, and of which he has expressed his appreciation and gratitude by carrying them practically into effect. These advantages are not only very limited, but are largely militated against in all large towns by the unavoidable necessity of providing these spots of pleasurable and profitable recreation at such distances from the place of employment of the worker-tenant that he

* See Chapter V.

reaps but a fraction of the benefit he would, could they be placed at his door. In the case of a Garden City, this combination of comfortable dwelling with adequate garden, I shall hope to prove, can be commercially brought about, and it should be obvious that every endeavour should be made to carry the more advantageous disposition into effect. This being a matter more especially concerning the welfare and life of individuals in an established City or Village than in relation to the laying out of such, I have gone into it more fully in considering life in the proposed communities. It will there be found that, quite apart from the financial aspect, the provision of a garden having an area of from one-sixth to one-eighth of an acre to each operative dweller is that best proportioned to his use.

In the laying out of a new estate it appears to be taken for granted that the land *must* be divided up into *rectangles*, and, moreover, that such rectangles *must* be oblong.* Let us pause for a moment to consider the reason for this and the wisdom of it. I have reminded readers elsewhere that Nature is the best teacher, and that if we follow her we shall approach the maximum of efficiency. Now, the problem how to divide up a given superficies into spaces having the most *useful* shape is not solved in Nature by the use of rectangles, but by the

* Mr. Howard, it will be noted, proposes 'an average space of 20 feet by 130 feet.'

employment of one form only of the polyhedra—the hexagon. This is most entrancingly exemplified in regard to the laying-out of the beehive by the bee in such manner as not only to obtain the *maximum* of economy of space, but also the *maximum of utility* in regard to the *shape* of the individual 'allotments' combined with the *minimum wastage*. The prevailing practice of laying-out by means of oblongs is, of course, due to the desire to shorten, as much as possible, the length of the road frontage required for each, and thus reduce to a minimum the cost of road construction for a given enclosed area. I will, therefore, first consider with what degree of efficacy the prevailing practice gives the solution, and, further, whether, if Nature's dictates be obeyed, the laying-out of villages could not be carried out to greater effect.

Corners are always wasteful, whether in a house or in a garden, and if, through improper laying out, be it by circular design or the employment of diagonal roads, the angle of the corner should be less than a 'square corner'—*i.e.*, 90 degrees—the waste and inconvenience is accentuated. The question, then, is, Is there any other form in which the land can be divided up, which, whilst avoiding square corners, shall not give rise to wastage of any kind—such, for example, as would arise from the adoption of circular subdivision? The bee answers that there is *one* shape which has no corners—the angle of coincidence of the sides being

120 degrees instead of 90 degrees, one which, moreover, entails *no wastage*—one made use of by herself—the hexagon. So much for the first point. The second—the effect in relation to the length of roadways—will be best considered by the aid of a diagram, as the advantages and disadvantages will be more readily appreciated graphically than mathematically. In the diagram of this conformation R R is a straight road 34 feet wide, and having footways 8 feet wide on either side, a lawn 8 feet in width extending the whole length at the centre of the roadway. The assumption I make is that the dwellings of the operatives shall each be surrounded by a minimum space—as at Bourneville—of *one-sixth of an acre.* To provide the one-sixth of an acre on the rectangular system, and to prevent the oblongs becoming inconveniently oblate, their width, and hence the length of frontage of each, cannot well be less than 30 feet. It must be remembered, also, that if gardening operations are to be carried on a space must be left between each cottage. This mode of subdivision is also plotted.

The Village, in accordance with my proposition, would be laid out as shown in the Plate, and the following brief description will enable the reader to better comprehend the nature and effect of this configuration. It will be remembered that the Village, together with the industrial zone, would be situated to the north of the City and on the opposite side of the railway, the line thus forming

the northern boundary of the City, and the southern of the Village—the workmen's habitation. It extends from this line in a northerly direction until it reaches an existing road (shown upon the Ordnance Map), whilst it extends, both on its western and eastern boundaries, beyond the City.*

Commencing upon the westerly side, we have a series of house plots, some 460† in number, arranged, as are all the plots in the Village, on the hexagonal system described. These lie between the boundary-line and the first road in alternate rows of eleven and twelve deep. The road next to these is 50 feet wide, and runs from the railway-line to the northern boundary in a direction parallel to those in the City. The next collocation of houses, lying to the east of this road, some 400 in number, is arranged in alternate rows of ten and eleven houses. This brings us to another 50-foot road running parallel

* Whereas the City is 2,336·6 yards in its greatest length and 1,883·3 yards in its greatest breadth, the village is 1,093·3 yards in its longest and 2,733·3 yards at its widest.

† Although great care has been taken to plot out the plan as nearly as possible to the figure of ⅛ acre per dwelling, it was found that the bases of each hexagon, whilst approaching to the third part of 160 feet, could not be plotted with perfect accuracy upon paper, owing to the necessary smallness of the scale. The plots as shown are on a base measuring, as above mentioned, the third part of 160 feet; this makes the number of cottages in a plot appear less on the plan than would be the case in actual practice. The figures given in the text are those appearing on the plan, and are less in number than would actually obtain in practice.

to the one mentioned above. East of this second road there is a third enclosure of dwelling plots, some 184 in number, running in rows of five and six alternately.

This brings us to the third road, by far the most important in the Village, seeing that it is a continuation of 'First Promenade West' of the City, extending across the railway-line completely through the Village to its northern boundary. This constitutes, in fact, a very noble thoroughfare completely traversing the entire length of City and Village—an imposing promenade highway, 80 feet in width, throughout its whole length, and in connection with the 'Great North Road' at each of its extremities. The southerly portion of this thoroughfare forms one of the principal arteries of the City, and leads to the 'Agora,' or market-place, which we find on its eastern side just after crossing the railway-bridge. Its northerly portion, on its west side, contains the shops designed to supply the needs of the villagers; whilst beyond the Agora, and lying between the Promenade and the park, is a strip of copse and wooded land some 150 feet deep, upon which would be built, as the Village grew, churches, village schools, club-rooms, gymnasia, baths, workmen's reading-rooms, and such-like institutions designed for the recreation and welfare of the workers in Garden City. All these institutions would have their rear façades facing the park and their grounds extending into it, so that

refreshments might be taken out of doors, and rest, relaxation, reading and other entertainment take place *al fresco.*

This 'People's Park,' lying immediately north of the Agora, is some 66¾ acres in extent, whilst south of it is a beautifully level piece of land naturally designed to form the cricket-field and sports ground of the community. These, it will be observed, lie immediately outside the railway-station, from whence the 'Grand Stand' could be reached under cover.

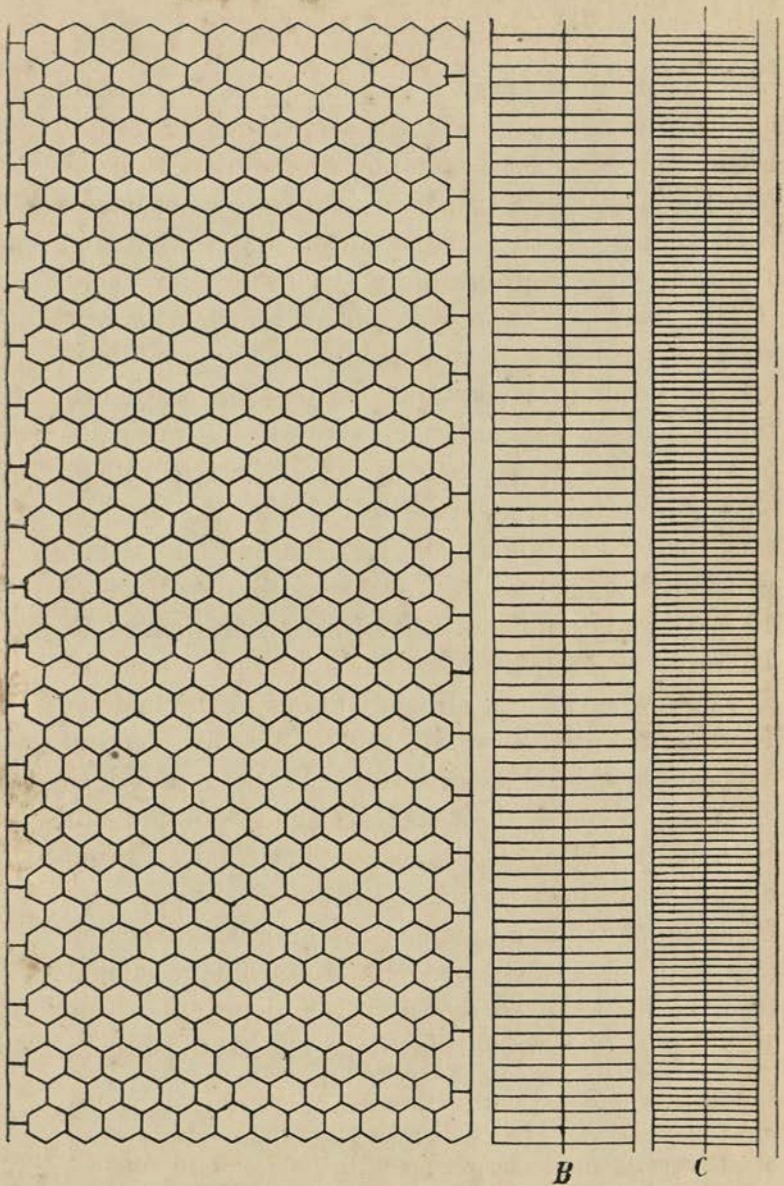
In the vacant corner north-west of the park can be placed some 100 cottage-plots as time and development might demand. Between these and the park, as also on its eastern side, is a roadway some 35 feet wide, making a division between the backs of the cottages and the park itself. Leaving the park and proceeding eastwards, we have a block of some 170 house-plots; this piece of land, it will be seen, is very irregular in shape, but it leads to a 35-foot roadway running correctly parallel to the other roads on this side of the village, as well as with its eastern boundary. Continuing eastwards of this road we find a block of house-plots, 150 in number, arranged in rows of six and seven alternately, then a second roadway 35 feet in width. This is followed by another plot containing some 156 house-plots, which in their turn lead on to a third roadway of 35 feet width. Following this is a last block of some 180 plots, giving upon a road

already existing, which may be utilized to form the eastern boundary of the Village.

The total number of dwelling-plots thus set out is about 1,800,* providing accommodation for some 9,000 villagers. In the actual plotting out of the land, however, the number of dwellings would be greater, and with the tenement buildings it is suggested should be provided, the accommodation would be ample, on this basis, for a population of 10,000, seeing that the 478·53 acres covered works out at an actual density of about thirty persons to the acre actually enclosed, whilst the number of inhabitants per acre of the land of the Village would be but about twenty-one.

I have already referred to the ugliness produced by plotting out a countryside into numerous rectangles, and also the great convenience of using a polygon, which has no acute and therefore largely wasteful corners, as exemplified in the economy of space attained in the bee-hive. This I have ventured to suggest is coupled with the further advantage, from the æsthetic point of view, of the natural enlacement of these hexagons. But the great value of the innovation lies in its great economy, brought about by reduction in road mileage. Careful mensuration shows that the cost

* If the whole of the land, some 352 acres, were laid out in house-plots of six to the acre, then the number of dwellings actually provided for would be 2,112—a number sufficing for a population of 10,560. It is not intended, however, that the space should be filled up to its utmost capacity in this manner.



Economy in Village Roadway Construction.

The author's hexagonal system (one-sixth acre plots), compared with (B) the usual rectanglar method with 40 feet frontages (also one-sixth acre as at Bournville), and (C) Howard's 20 feet frontages (area, one-sixteenth of an acre).

of roads required for such an industrial village *is but one-fifth of that required in the ordinary method* of laying out—as, for example, that advocated by Mr. Howard—viz., the setting out in rows of houses back to back, each plot having a depth of about 130 feet, with frontages of 20 feet to 30 feet.

The immense importance of this when one is striving to reduce to the minimum the rentals of artisan dwellings is brought home when a calculation is made of the monetary saving. Taking roads of appropriately ample width—those for the Village having been taken as at 50 feet*—the cost of their construction may be taken at £4,000 per mile; then we find that the cost of roadways for a village of 10,000 inhabitants laid out upon the ordinary—or Howard, 20 feet by 130 feet—system, would be £15,150, whereas in a village laid out in the manner I advocate, and show in regard to the western collocation, this expenditure would be reduced to £5,270. It must, however, be again pointed out that plots having frontages of but 20 feet bring about serious overcrowding. If one-sixth of an acre be taken as the minimum per dwelling, as advocated and is the case at Bourneville, the frontage should then be at least 40 feet (with a depth of about 182 feet). This would have the effect of doubling

* This is 10 feet wider than the roads of Port Sunlight, and in order to enable the reader to form an idea of the appearance of a 50-foot road three illustrations of the 40-foot roads in that interesting village are given.

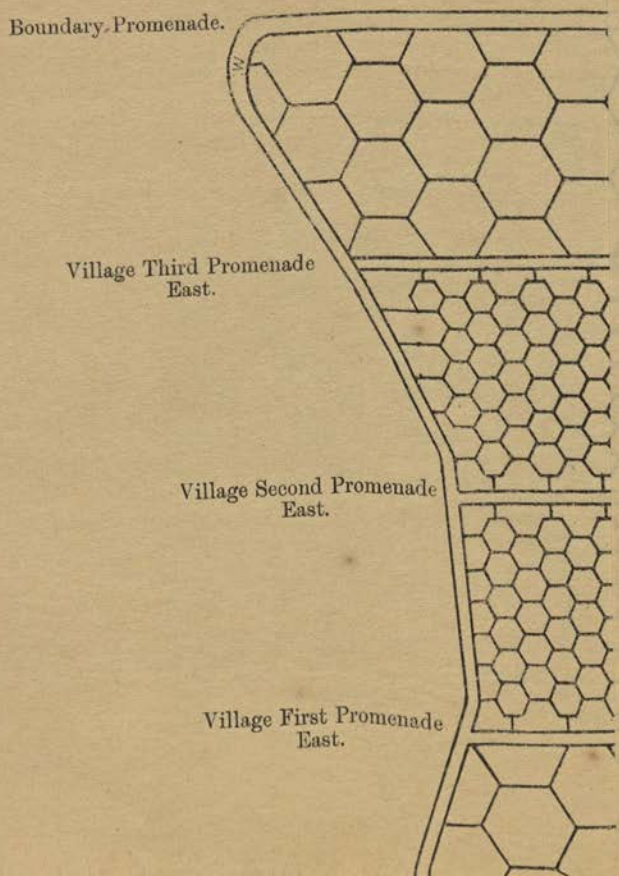
SENNETT'S PLAN OF A GARDEN VILLAGE FOR 10,000 INHABITANTS; AREA, 478·53 ACRES.

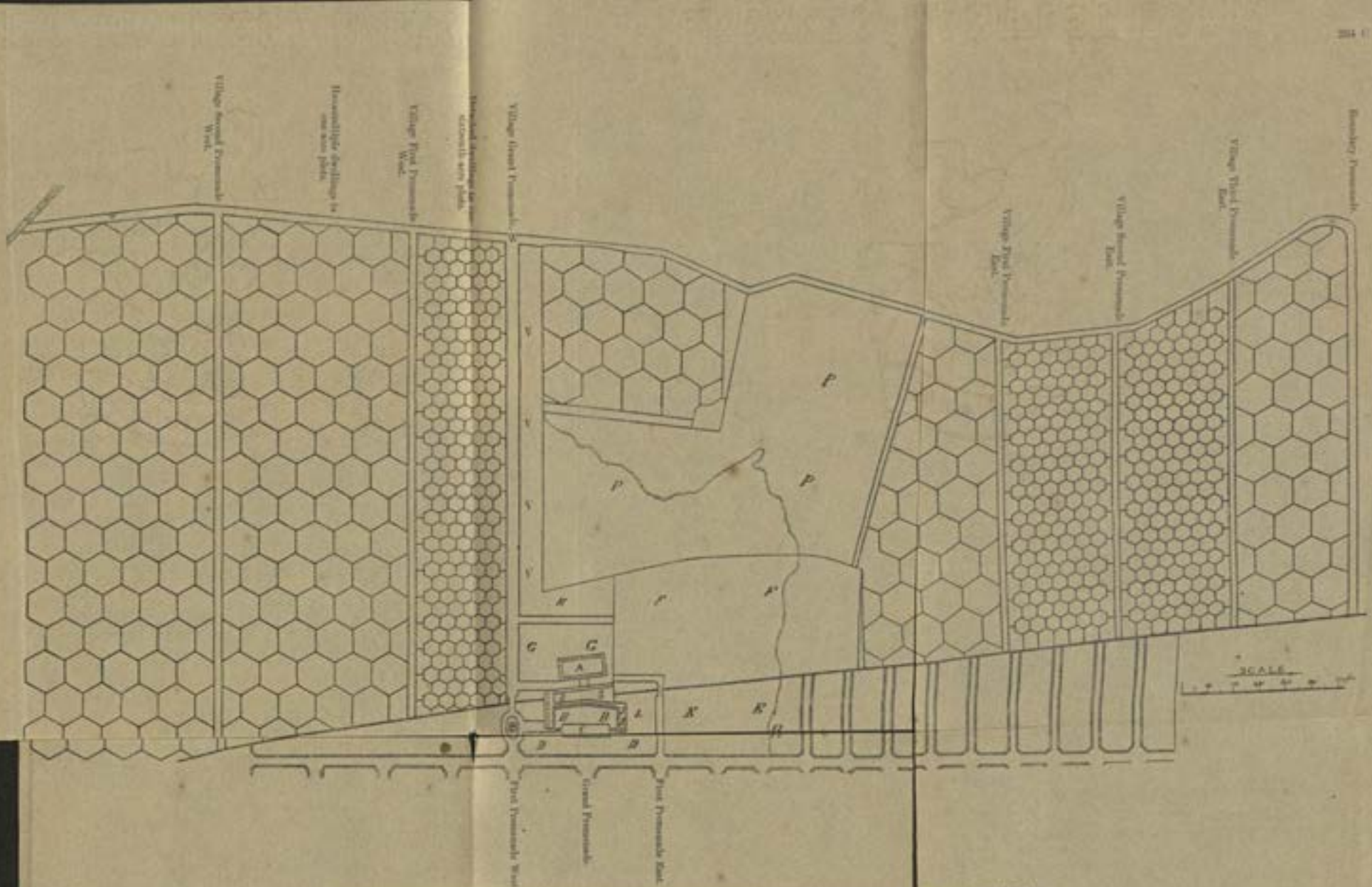
	Subdivisions.	Residential.	Commercial.	Factory.	Roads.	Parks.	Public Buildings.	Width of Road.
		Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Yards.
	West of Park.							
1	House Block A	88·6708						
2	First Road	—	—	—	3·7878	—	—	16·66
3	House Block B	75·3271						
4	Second Road	—	—	—	3·4435	—	—	16·66
5	House Block C	38·8131						
6	Third Road	—	—	—	3·2892	—	—	26·66
7	Land for Public Buildings D*	—	7·2658					
8	House Block E	22·2222						
9	Roads North-West of Park	—	—	—	1·2637	—	—	16·66 11·66
10	People's Park	—	—	—	—	66·7952		
11	Agora	—	3·3818	—	1·8342	29·5131		
12	Recreation Ground ...							
	East of Park.							
13	Road East of Park ...	—	—	—	1·2695	—	—	11·66
14	House Block F	34·1137						
15	First Road East ...	—	—	—	1·5426	—	—	11·66
16	House Block G	29·5316						
17	Second Road East ...	—	—	—	1·5426	—	—	11·66
18	House Block H	30·3396						
19	Third Road East ...	—	—	—	1·6712	—	—	11·66
20	House Block I	32·9153						
		351·9334	10·6476		19·6443	96·3083		

* This land is commercially useful to the inhabitants, as the buildings to be thereon erected may all be taken as concerns paying rent to the community, and is therefore classed in this column as distinct from land covered with buildings for public buildings which would not pay rent to the community.

Total area of land commercially useful = 363·38 acres = 175·39 sq. yards per inhabitant.
" " " unprofitable to Village = 116·15 " = 56·21 " " " "
Ratio of profitable to unprofitable as 3 : 1.

A. Agora.
BB. Colonnade Gardens.
C. Capitol.
DD. Capitol Gardens.
EE. City Recreation Grounds, with cascade leading to river, R.
T. Theatre.
FF. Village Recreation Grounds.
GG. Agora Gardens.
H. Technical Institution and Arboretum.
PP. People's Park.
VVVV. Village institutions, various.
J. School of Art and Picture Gallery.
K. Winter Garden and Concert Room, going by a colonnade on to the Eastern Gardens, L.
SS. Railway-station.
WWWW. Existing road.


Boundary Promenade.
Village Third Promenade East.
Village Second Promenade East.
Village First Promenade East.



Author's Design for a Garden Village of 10,000 Inhabitants, each dwelling having the Minimum of One-sixth of an Acre of Garden.

the cost of road construction, which would, therefore, then stand at £30,300, as against £5,270, or *nearly six times the cost of the hexagonal plotting* I advocate.* These figures, I feel, speak for themselves with sufficient emphasis to warrant the idea being put into practice.

Further particulars concerning the Village will be found in the table on p. 234.

From the foregoing remarks, I trust I may have shown that by taking a lesson out of 'Dame Nature's' book, a more economical and more convenient system of laying out villages can be carried into effect. But Nature herself never does anything productive of ugly effect. If one stops to reflect how multifarious are the forms of Nature, how numerous the colourings, it is truly wonderful to find them all blending so harmoniously, not only as to beauteous grading in colour, but pleasure-imparting merging in transition of form. Let us picture a verdant upland, say the South Downs; what a glorious vista we have! What a succession of graceful curves compose and connect all things upon the gently-receding surface of the slopes! Mile after mile it stretches away; it changes from one thing to another, yet there is not one *straight* or *hard* line. Demarcation as between pasture

* A small percentage deduction must, of course, be made in regard to the asphalte footways giving access to the plots not adjacent to the roadways.

and woodland, mead and copse, hill and dell, is effected entirely by soft gradations of colour; the fresher green of the waving meadow blade merges with the richer hue of the swaying leaf. Even the terminal margin—the partitioning off of earth from sky—shows no trace of rectilineality, no harsh fencing off of demesnes. There, again, the eye is delighted with graceful curves and continuity in forms of sinuose, subdued serration.

Thus is presented to us the placid and unscarred face of Nature; but as industry insinuates itself, so do the scars and scratches, the gashes and festers, appear and multiply. In regard to the open country, the eye—though it may see with regret the precincts of Nature invaded—becomes not offended with the more or less rectilinear and rectangular enclosures, so long as these remain, individually, of great size. There is then, indeed, presented a charm of artifice thrusting itself into Nature's picture, an expanse of country under cultivation whereon are plotted great and irregular tracts of arable land, their rich yet sombre brown contrasting with the brightness of the irregular pastures, the whole being demarcated by the soft foliage of sinuous hedgerows. This is justly called 'lovely.' When, however, the fields become individually of small area; when their boundaries are straight lines; when their regularity persistently declares itself; when, in fact, the countryside

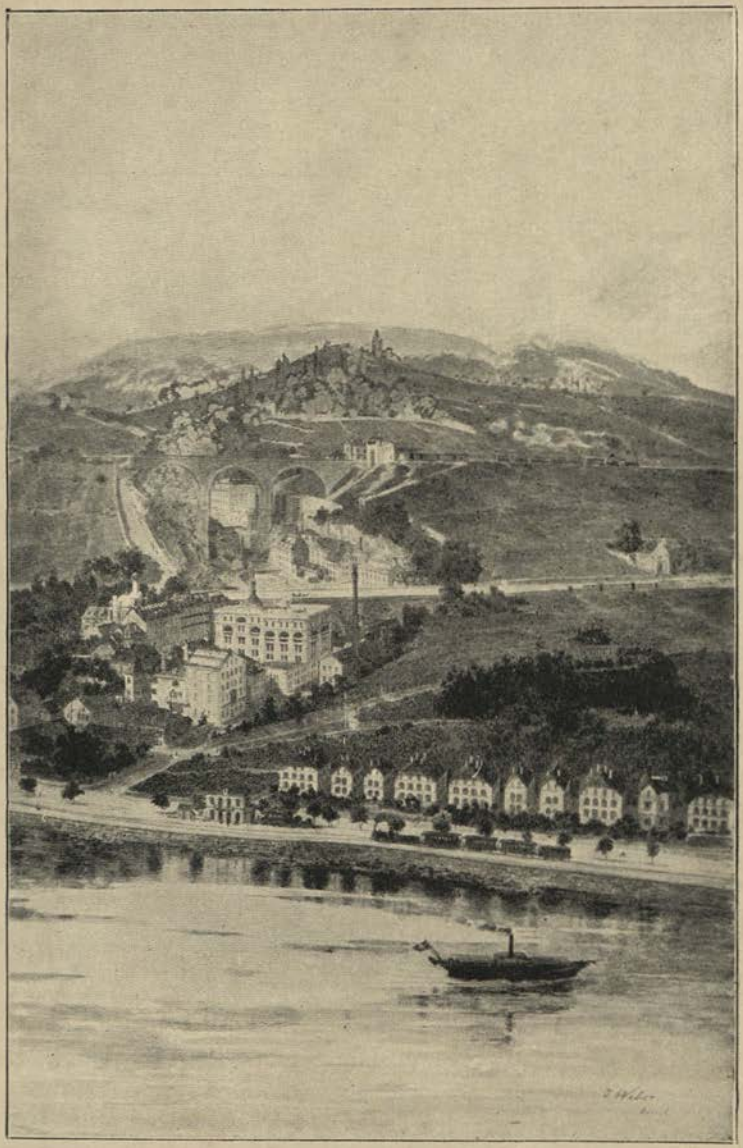
becomes an enlarged chess-board, then has all true and natural beauty flown. There is probably nothing more unsightly than an area divided up into small vegetable-growing allotments. Their strict regularity, their straight and sudden boundaries, the harsh contrast of neighbouring plots, their inherent and necessary untidiness, accentuated by the fact that the tiller must perforce emplace thereon rough and uncouth sheds and shelters hideous in their heterogeneity, which would not be the case if his plot surrounded his cottage—all combine to form a far from pleasing whole.

If, however, the reader will kindly picture in the mind an upland—or, rather, two uplands converging to form a shallow valley—and that the green sides of these be laid out in a hexagonal enlacement or open network, formed by the intertwining of green hedgerows, each 'mesh' or interlacing an acre in extent, each green hexagon* containing at its centre an hexagonal spot of colour —a red house toned by green creeper—from each central spot six rays divaricating in form of flower-enlivened gardens, then will he understand the configuration I propose. Then also will, I hope, be appreciated the fact that, by following Nature,

* A good and utilitarian and economical mode of demarcating the plots is by planting artichokes, as these, whilst providing wind-shelter superior to walls, at the same time yield their crop, whilst no initial expense in the erection of boundaries *per se* is incurred.

at minimum of cost could be built a village combining the maximum of convenience with a not inartistic effect.

An ideal site for an industrial Village exists upon the Hertfordshire land upon the undulating slopes on either side of 'Norton Common,' an expanse of copse-land well suited to be converted into a people's park. From every point of view, it is to be hoped that such economic utilization of rural land upon the system I advocate should be entered upon, because it must be borne in mind that the object to be aimed at is to give the artisan the maximum of accommodation in his dwelling with maximum size of garden at the minimum of rental. Now, the cost of unnecessary roads will increase the rental of the workman's house, and, far from being desired by him, they constitute a great disadvantage, by reason of the dirt and dust caused to enter both his garden and his house. It is the more to be hoped because it will be a pity to lose the opportunity of affording an object-lesson which might subsequently be extensively followed with economic advantage throughout the country.



The Garden Village of Serrières, Switzerland.

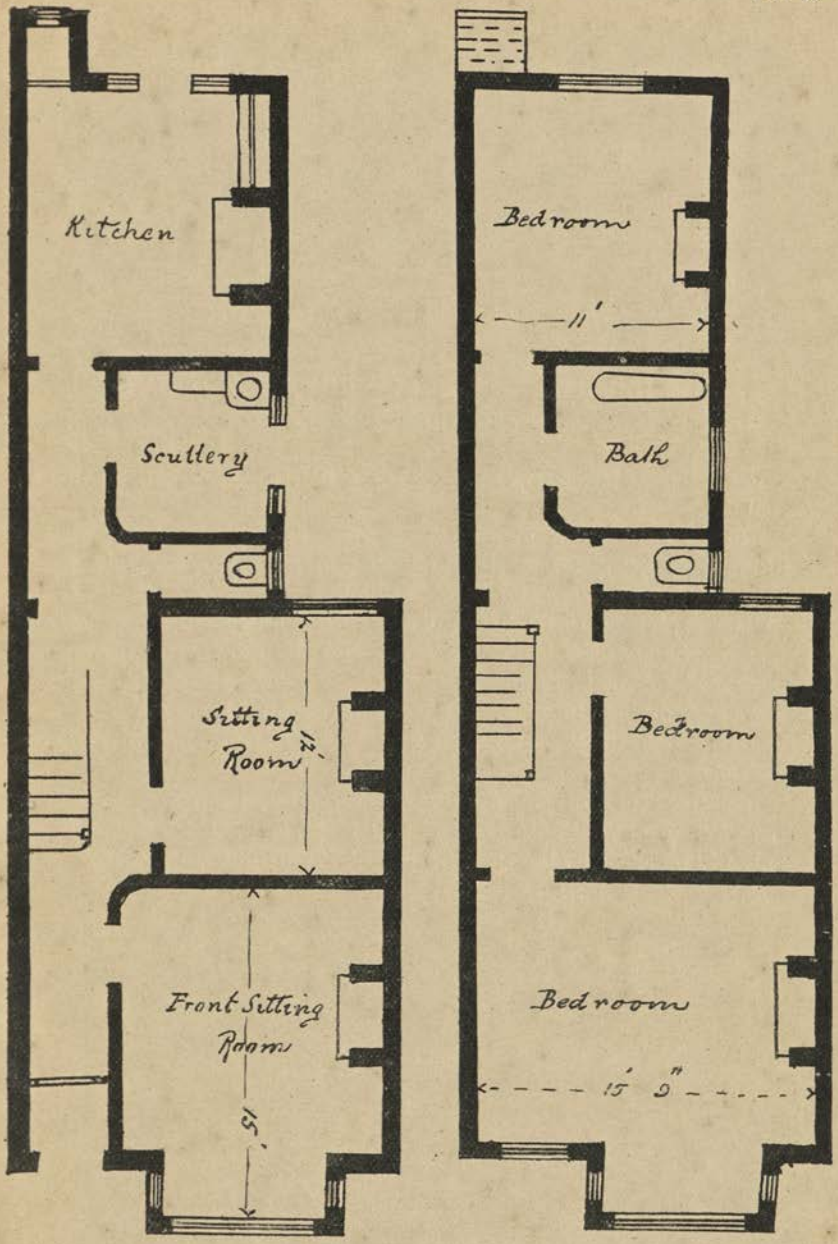
VILLAGE DWELLINGS

TURNING to the village dwellings, we find ourselves hedged around in most uncomfortable and inconvenient manner. Any liberality of basis is at once prohibited by the consideration that capital expenditure is absolutely limited, and this to a figure calling forth much ingenuity on the part of the architect to, so to speak, cut a coat out of a quantity of material better adapted to the building of a jacket; for the capital expenditure is in its turn limited by the return it is right and proper the worker-tenant should pay for the accommodation suited to his requirements. These are hedges through which one cannot, by any means, manage to make one's escape: they are inevitable. There are others, however, to be met, which should *not* have to be met in a Garden City, for it has been decreed—improperly decreed—by the powers that be that what is proper and requisite for a town tenement is also *apropos* and requisite in a country one. Another difficulty arises from human

nature itself, for the consideration shown to another's property is often of quite a different *genre* to that shown to self-owned property. Hence it is found absolutely necessary to provide for a depreciation *percentage* considerably higher than that which should be necessary. Under certain conditions ways and means of counteracting this latter have been found, the only ones within my own knowledge, however, being the two I now refer to, the system adopted in connection with a very interesting co-operative housing experiment recently entered upon on the outskirts of London and typified in the erection of a number of working-men villas at Ealing, under the title of 'The Ealing Tenants, Ltd.' In this instance *all the tenants are shareholders*, and the amount available for division in dividends is, of course, influenced by the amount expended during the current year upon repairs; hence it is to the *tenant's own interest* to keep his repairs down to a minimum.* Similar in its effect

* The essential principles underlying the scheme are that the tenants become 'joint' instead of 'individual' owners, and their amalgamation and registration under the Industrial and Provident Societies Act enables capital to be raised by the issue of 'loan stock,' much in the same way as money is enabled to be got together from 'outside,' and therefore *quasi* philanthropic, subscribers, by the co-operation of farmers in regard to dairying, fully explained in Chapter VI. The rate of interest payable in dividends upon such 'loan stock' is limited to 4½ per cent., the interest upon the holdings of 'tenant members' being fixed at

Dwellings erected by 'The Ealing Tenants, Limited'
(front and rear Views).



Ground and First-floor Plans of Dwellings erected by the Ealing Tenants.

PARTICULARS OF DWELLINGS BUILT BY THE EALING TENANTS.

Forecourts 15 feet in depth; paved (tiles) path; iron railing on dwa wall.

Kitchen fitted with glass-fronted dresser; Eagle pattern range lifting fire; hot-water service to bath and scullery. Skylight over landing lights staircase and ventilates house.

Back garden 50 to 60 feet in depth, with 6-foot right-of-way along bottom, giving access to these gardens and the gardens of houses in next road. A main drain runs under this right-of-way, and all the houses are drained into it. No drains are taken under any part of the houses. Rain-water is taken to the surface-water drain in front of the houses.

Inclusive rent to members, 13s. weekly, fixed on existing rates. In the event of any increase in rates and taxes, the extra rating charge only will be borne by the tenant, the rental remaining the same.

as a check upon wantonness in unrestrained repairs is the system recently had recourse to in the industrial village of Port Sunlight. I have already mentioned that this model village cannot be taken also as a model to be copied from in regard to 'Garden Villages,' since the latter must perforce be so designed and matters so arranged financially as to cause it to be self-supporting. In this instance the rents were fixed at such amount as only to repay the outgoings—viz., rates, taxes, repairs, and maintenance. It was found that the cost of repairs gradually grew to extravagant proportions, owing to the fact that every tenant was allowed practically

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5 per cent.; but this is supplemented by the division of all surplus profits, in proportion to the rents paid by them, amongst this class of the shareholders. Any workman may become a tenant-shareholder by taking one £10 share, payable £5 on allotment and the balance by instalments, provided for in the registered rules of the society. Sooner or later, however, he must acquire five of such shares, thus bringing his holding up to £50, the approximate value of the plot of land upon which his house is built. The surplus profits are credited to the members in shares, instead of being paid in cash; hence he is always becoming an increasingly large shareholder. An important matter is also satisfactorily disposed of among other advantages: for one of the difficulties of working-men dwelling proprietors arises from the possible necessity for his removal to another district, in which case he might not be sufficient of a capitalist to reap similar benefits elsewhere, even if similar facilities existed. Under this system he can, on leaving, dispose of his holding—more easily, indeed, than he could his house. A block of neat little villas built in this manner at Ealing is illustrated.

any repairs he asked for, this being allowable from the fact that the tenants as a whole paid the total cost of repairs and maintenance. The effect of this, added to increase of maintenance charges consequent upon extension of roads and parks, was that the rentals had to be increased in a very heavy ratio—viz., from three to five shillings per cottage per week. Now, had there been a 'landlord'—in the ordinary acceptation of the term—there would also have been an outcry and an accusation of 'oppression.' In this case the extravagance recoiled upon the *tenants*, instead of the landlords, and taught them a salutary lesson, with the result that a most significant reduction in the number of requisitions for repairs has ensued. I am, therefore, constrained to feel that in Garden Cities some such system of co-operative housing should receive very careful consideration; for it is obvious that, whilst protecting the landlord—*i.e.*, the community—it would also prove beneficial to the tenant-shareholders. The system, it would appear, would be equally effective in regard to long leases—say ninety-nine years, or even the three nines—as in regard to freehold dwellings.*

* It has been found, in regard to 'block' dwellings, that the cost of repairs amounts to an average of from 6 per cent. to 14 per cent. upon the rental, according to the scheme, quality of the work, and class of dwelling. It is obvious, in regard to lofty buildings—especially those having concrete roofs—that the cost

Quite apart from sumptuousness, ornament, or size, the cost price of a small dwelling is very seriously affected by three different factors: (*a*) the *amount* of *land* allowed to it; (*b*) the *amount* of *frontage* of such land; and (*c*) the *type* of dwelling. The question before us is, How can the militant effect of each be reduced to a minimum? The answers are, in regard to (*a*), the acquisition of land at agricultural value, as has been done in regard to the 'First Garden City'; as to (*b*), the adoption of a new system of laying out, whereby the amount of highway construction, kerbing, paving, main sewer, etc., is reduced relatively to the number of houses on a particular area—such a mode of laying out, for example, as that just described; whilst the reply to the last is at once simple but unsatisfactory—namely, that in towns the individual dwellings should be agglomerated into 'blocks,' each containing a large number of tenements. This solution is both rational and scientific. We in England, however, have more sympathy with sentiment than science. We are long—by reason of our deficient training in this regard—in viewing problems from the standpoint of science, and we are far longer in adopting the scientific dictates when they *have* been pointed out to us. In Germany, for example,

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of *external* repairs is considerably reduced. In the Glasgow Municipal Buildings repairs amount to 10 per cent., in the London County Council Buildings to 12 per cent.

a country which, of late years, has made most extraordinary strides, simply and solely through the combination of science with common-sense, we find the only persons, of the lower middle classes, who live in isolated dwellings are yeomen who have inherited their homesteads. Everyone else—the employer and the employed alike—lives in Wohnungen ('flat' dwellings). We inquire why this should be, and the reply is the rational one, 'Because with a given amount of land, material, and labour, *better* accommodation can be obtained and provided from a given capital expenditure!' The more practical Scot, moreover, with his watchful e'e e'er upon the economics of all questions, runs the Teuton close in the number of his 'tenement houses' and the fewness of his 'self-contained.' Surely, moreover, it is misplacement of such sentiment in these days of 'flats' occupied by the wealthy, by the middle class, and by the poor alike; the dwellings of the latter, indeed, are constructed of the same material as those of the richer, the distinction alone consisting of size and internal ornamentation. From the point of view of health, moreover, it cannot be doubted that the hygienic conditions and healthiness of 'flats' situated at a considerable altitude* above our

* People suffering from insomnia have found benefit by sleeping in the highest flats obtainable in London, where, but for the smoke, the air is much fresher and purer.

streets is far superior to that of the lower and ground-floor rooms—and this will continue to be the case so long as our present unscientific method of 'sewer ventilation' (*sic*), and hence street pollution, continues.

Nothing, therefore, is to be validly urged against 'tenement buildings' *per se*, especially if they be built open on both sides, and not in the enclosed 'well' form—in which air stagnates—so common in London.* There should, therefore, in my opinion, appear in 'Garden Village' *three* distinct types of industrial dwelling: (*a*) Detached or semi-detached cottages for foremen and for family men, who have monetary assistance in housekeeping from members of their families; (*b*) 'grouped' houses, which can be let individually at lower rentals than the foregoing, also for family men; and (*c*) tenement blocks, intended especially for single men, who by such buildings would reap material advantages from the social rooms contained therein, and from their being able to obtain good and cheap meals where no wife is available for their preparation. These men, moreover, are those to whom gardening does not offer the fascination it does to those of maturer years and married men who have wives and offspring to enjoy the results of their gardening operations. For the housing of single girls employed in factories, it would appear, *primâ*

* Even in regard to our most expensive flats

facie, that nothing could be more appropriate than similar tenement blocks, the bed-sitting-rooms of which might be of good size, and furnished with a 'recess' bedchamber provided with curtains, so that it might be shut off during the day, and thus the occupant induced to take a greater pride in her comfortable little sitting-room or parlour than she would perhaps do in regard to a bedroom, into which she would be less likely to introduce her girl acquaintances.* The ground-floor of such tenement blocks would be occupied by the girls' social rooms, whilst the quadrangle—of which three sides only would be built round—might economically be roofed over, at good height, so as to utilize the walls for the support of such roof on *three* sides, the fourth side being carried upon columns and enclosed by sliding glazed doors, so

* It should be mentioned that, with laudable endeavour, at a very early date in the life of their village, Messrs. Lever tried such an experiment upon a small scale. For this purpose they set apart four houses, each with twelve cubicle bedrooms, and with bath-rooms, parlour, living-room, kitchen, and all the necessary equipment for accommodating a total of forty-eight girls—a dozen girls to each house. The charge for this accommodation was 2s. 6d. a week for each girl, and this included everything except washing of the girls' wearing apparel and cost of food. These homes, however, never attracted more than a dozen girls at one time, the fact being attributed principally to the ridicule of the other girls employed in the same factory. It is probable, however, that this is one of those things of which we so often have exemplifications that certain things cannot be made successful except upon a scale of some magnitude.

that the building, nominally a gymnasium, would act as a Winter Garden, and as summer and winter baths, as well as a place for games in inclement weather. The conduct of these houses and the provision of apposite recreations therein would be under the supervision of an executive committee of ladies appointed by the Women's Guild; in which case, granted that the maximum of freedom were allowed to the girls, so that they might look upon such dwellings as *their homes*, not that they were dwelling in '*a home*'—that no teaching, religious or otherwise, were forced upon them, but teaching left entirely to that most potent of teachers—example—then, one cannot but feel such a mode of life would be, not only highly appreciated, but eagerly sought after. Such tenement buildings—in order to reduce, to the lowest possible, the number of cooking appliances required in the village, and also effect material diminution in the cost of fuel and labour necessary in connection with the serving of meals—I would recommend, should be built in conjunction with the public mess-rooms I also advocate (see 'Industrial Zone,' and also plan of village).

The relation of capital expenditure to cubical return in buildings of various heights is a matter that, perforce, must receive due consideration in the building of an industrial village. Being, however, highly technical in its nature, I have thought

best to deal with it more fully in the appendix to this chapter. I should like, however, to point out here that the *height* of 'block' buildings is determined almost wholly by financial considerations, and that such financial considerations are influenced by *two* principal factors: (*a*) increase of cost of construction, due to increase in the number of stories, and (*b*) increase of expenditure upon land, due to decrease in the height of the 'blocks.' It will be seen at once that these two factors are antagonistic; it will also be seen that where land is very dear the blocks must also be very lofty, despite the fact that, structurally, the cost of building—based upon the unit of floor area—may be twice as much in lofty buildings as in those having a very small number of stories. This augurs well in regard to Garden Cities, for, as will be seen by perusal of the appendix, it is very unlikely that anything higher than ground-floor and two-above-it buildings will make their appearance even in the case of the industrial tenement 'blocks' I—from financial considerations—advocate. Here I will only refer to the practical advantages and disadvantages of detached, semi-detached, and grouped dwellings.

As far as regards independence of both feeling and action, the detached dwelling is, of course, the *acme*. It is the one form in which the insular Britisher may say 'My house is my castle.' There be those,

Houses designed by Mr. C. E. Mallows, F.R.I.B.A., of Bedford. Style, Local Traditional, 17th-18th Century. Cost, £1,300 to £1,400.

House designed by Mr. C. E. Mallows, F.R.I.B.A. Cost about £900.

A Room by same Designer, 30 feet × 17 feet × 8 feet, with Fireplace in Inglenook.

however, by whom such advantages may be bought too dearly. It must be remembered that in this type of dwelling every brick, every service-pipe or cable, every drain-pipe, can but fulfil a single duty —the service of one occupier. Such advantages as accrue over and above those of attached and grouped dwellings must, of course, be paid for in appropriate ratio. It would seem unreasonable to be called upon to provide advantages and luxuries —which, in reality, would only be appreciated by older and family men—for those who had not made much progress up the ladder of social degrees. In the case of the former, men who could rightly appreciate refinements and advantages of this nature, men who by long residence in the village had proved themselves respected and highly desirable members of the industrial community, one cannot speak too highly of any measures— such as those to which I herein refer—having for their object the acquisition, by such citizen, of his home, thus increasing the satisfaction and happiness his past life may have brought him by the consciousness that 'he is his own landlord.'

Detached houses, well built, of roomy proportions, and standing upon a suitable area of ground, cannot, it is found, be built to let, even at a very low rate of interest return, at less than 12s. 6d. per week. For those who either cannot afford such, or who may not desire the accommodation afforded, re-

course should be had to 'attached' houses; whilst for single men, it is at once obvious, the proper course would be to provide spacious tenement buildings in which comfortable bed-sitting rooms and joint bathing accommodation, with the use of social rooms and cooking appliances, could be afforded them at prices not exceeding 5s. to 7s. 6d. per week.

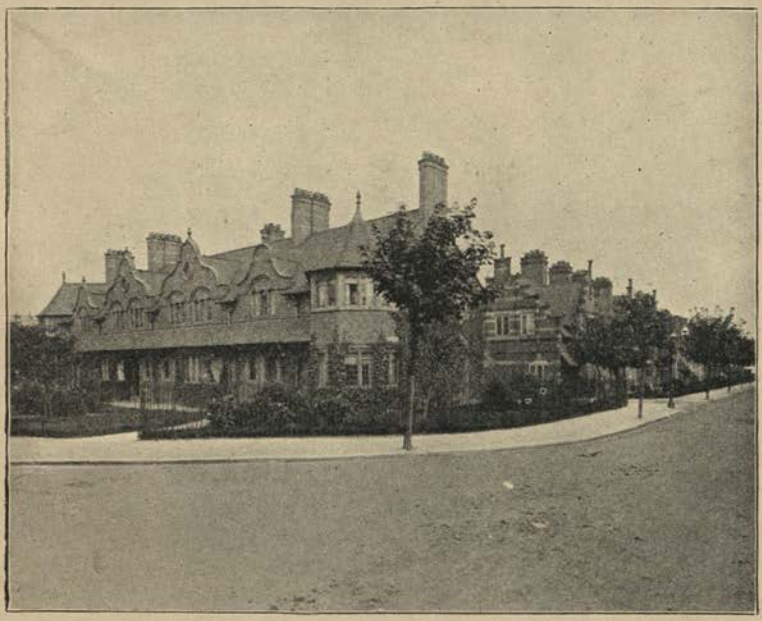
Dealing as I am now with a scheme which, *ex necessitate rei*, must be carried out in a thoroughly practical manner, and in such wise as to be self-supporting and profit-returning, I must perforce put aside all consideration of village dwellings erected as a 'hobby.' Such, for example, are the cottages upon certain private estates, those of noblemen and others, who have built them from æsthetic considerations and a love of Art and Architecture, coupled with laudable regard for the comfort of those employed upon their properties. Such dwellings, the provision of which entails not only great and unremunerative outlay, but also considerable annual expenditure, albeit the most interesting, lie, of course, quite beyond the scope of our present subject. Confining myself to industrial dwellings, I know of no instance where the provision of operatives' dwellings, combining ample internal space, comfort, and luxury of appointment with charming exteriors, has been pushed so far as in the Garden Village of Port Sunlight. I know, indeed, of no more enjoyable thing to offer to the

Typical Façades of Dwellings and Shops in a Garden Village—Port Sunlight.

Appearance of a 40-foot Urban Road.

Appearance of a 40-foot Suburban Road.

Appearance of a 40-foot Rural Road.



Appearance of a Corner on a 40-foot Road.

Typical Cottages at Port Sunlight.

reader interested in this grave problem than a visit to this architecturally picturesque village.

One must, however, also include this community in the above referred to category, for the reason that it is entirely unremunerative. It is, indeed, a 'hobby' ridden by Mr. W. H. Lever, who admits that Architecture is a branch of Art fascinating to him; and of this, it should certainly be added, he is undoubtedly a utilitarian expositor. The cost of the 140 acres of land upon which the 600 or so of cottages forming the village have been emplaced, the building of these dwellings, the laying-out of the requisite roads* (some four miles in aggregate length), the provision of the requisite schools, technical and other institutions, clubs, and such-like attributes of a complete village, has exceeded £350,000, no interest or other monetary return whatever being derivable from this large and dormant sum. By the courtesy of the proprietors, I am enabled to reproduce views of this interesting little colony—outcome of a single works—full descriptions of it being easily obtainable. The style of architecture adopted, as will be seen, is the Early English. The groups of cottages—varying from two to seven in each—are pretty and

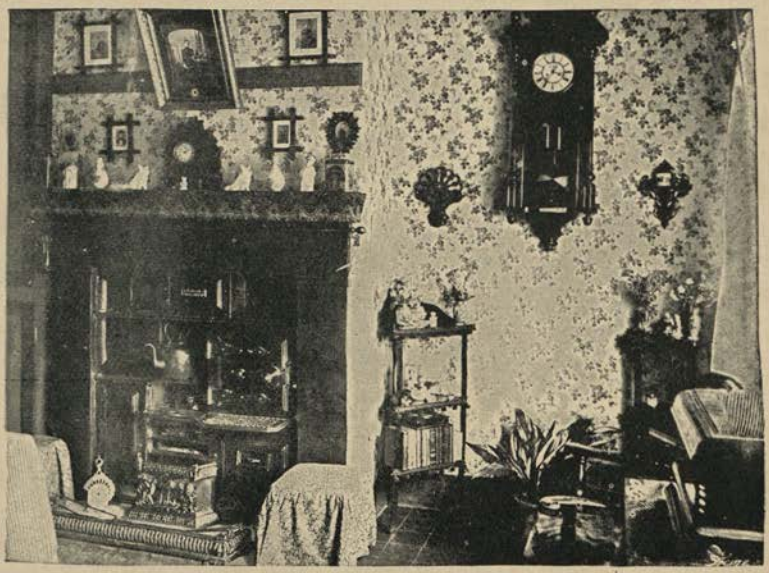
* The general width of the roads is 40 feet—say 8 yards roadway and 8 feet each for footpaths, it having been considered that the rule of making the footpaths as many feet in width as the roadways are yards wide was suitable in this instance.

dainty, the style of architecture appealing to our strongly-pronounced, natural and characteristic love of 'home.' The trim and tidy appearance of the village is secured by the provision of small gardens in front of the dwellings, these being kept up by the owners at a cost to them of about 3d. per week per cottage. Allotment gardens are provided, in as close proximity as possible to the respective groups of dwellings, and these are looked upon as 'the very safety-valve of the village.' They are let to the tenants at 5s. per annum per 10 perches, water being laid on and supplied free of charge.

Much in the same way, as I have mentioned, the difficulties of providing village dwellings are greater than those of providing the town dwellings, so is the difficulty of suitably proportioning the cubical contents and the subdivision of the cubical contents of operative dwellings to the needs of the tenants. If, for example, the rooms be made larger than is really necessary, this entails more work upon the wife than she is able to devote to their care; on the other hand, if the rooms be too small, they will not afford the requisite accommodation either for furniture or persons, and the cottages become unhealthy for the desired number of occupants. It is found, indeed, in practice that a very slight deviation from standard dimensions will determine the tenancy of industrial dwellings; hence, as Mr. Lever puts it, 'a workman's cottage must fit like a

Typical Cottages at Port Sunlight.

Parlour in Workman's Dwelling, Port Sunlight.



Kitchen in Workman's Dwelling, Port Sunlight.

glove the wants of the tenant if it is to be a successful attempt to provide for the happiness and comfort of himself, his wife and family.'

Experience, therefore, has led at Port Sunlight to the adoption of but *two* standard types of dwellings, called respectively cottages and parlour-cottages. The accommodation afforded by the standard 'cottage' comprises three bedrooms upstairs, and a living-room, kitchen, scullery, bath-room, and larder on the ground-floor, with an enclosed yard and usual outbuildings. The parlour-cottages differ from the foregoing in having an additional bedroom upon the first-floor and a parlour on the ground-floor. In some instances the sculleries have been fitted with a kitchen grate, so that all the cooking can be done there, and the kitchen used as a dining-room. The general type adopted for these parlour-cottages, having proved popular with the village dwellers, has been settled upon as permanent. Plans of both of these types of industrial homes are here reproduced, and a scale appears with each, so that the reader may ascertain any dimensions he may desire, and hence a detailed description is, I think, unnecessary. Illustrations showing types of the groups of operative dwellings are also given, from which the reader will be able to glean an idea of the architectural picturesqueness of this almost unique specimen of an industrial community.

I cannot, I feel, more appropriately conclude this short reference to Port Sunlight than in the words of Mr. Lever: 'The tendency has been during the last few years for our architects to become more and more elaborate in architectural design, and more and more extravagant in the use of costly building material. Although this has been done with the most happy results in the majority of cases, I look upon such buildings as teaching merely what can be done with unlimited money; and whilst this is very right and proper in its own way, it does not teach us so useful a lesson as the more difficult one of planning and designing simple, beautiful, and inexpensive buildings, suitable to village life and village means.'

I will now refer to a garden village laid down upon business lines in order that it shall return a moderate profit to the 'Trust' controlling it—a 'Trust' of such nature that it is hoped it will be, later on, enabled to lay out similar villages, and bring about the establishment of similar communities. Even in this case, however—that of Bourneville—it would be inaccurate to class the creation as an 'industrial village' in the sense of one intended solely for the housing of operatives, for its inhabitants number amongst them a considerable proportion of those of higher social standing. The area controlled by the 'Trust,' only part of which, about 100 acres, is at present built over, is

Typical Façades at Port Sunlight.

Typical Façades at Port Sunlight.

458 acres in extent. It is laid out with roads 42 feet wide, space having been reserved for parks, a village 'green,' children's playground, and the like. Up to the present some 500 houses have been built, providing housing for a population of some 2,000 inhabitants. The donor to the 'Trust' of the land and the dwellings at the time thereon standing, valued at some £180,000—Mr. George Cadbury—thoroughly appreciated the disadvantages—nay, dangers—likely to accrue from sectarianism, for the deed of trust explicitly sets out that 'it shall be a violation of the intention of the Founder if participation in its benefits should be excluded on the ground of religious belief or political bias.' 'The administration of the Trust shall be wholly unsectarian and non-political, and there shall always be a rigid exclusion of all influences *calculated or tending to impart to it a character sectarian* as regards religion or belief, or exclusive as regards politics.' The revenue, whether from house and farm rents, ground-rents, or any other source, is to be employed by the trustees, after making provision for the repair and maintenance of the property, in building more houses and further developing the estate. It will thus be seen the scheme contains within it the principle of continuous growth, for, obviously, the income, in course of time, will so increase as to admit of indefinite extension.

The dwellings, which, as a rule, are either semi-detached or in blocks of four, are set well back from the roadways, so as to increase the boldness of effect. The rents range from 5s. 6d. per week, rates included, to 12s. a week, rates not included, with a sprinkling of more pretentious dwellings at higher rentals. The smaller houses comprise (on the ground-floor) : living-room or kitchen, 16 feet 6 inches by 11 feet 6 inches ; parlour, 13 feet 6 inches by 11 feet, and 'bay' window ; scullery, 7 feet by 7 feet 6 inches ; (on the first floor) bedroom, 13 feet 6 inches by 11 feet ; a second, 11 feet 6 inches by 9 feet ; and a third, 7 feet 3 inches by 8 feet 6 inches, and a linen-closet. A bath is also provided to each, which, in the case of some of these smaller ones, is sunk in the scullery floor in order to economize space. The larger cottages have similar accommodation, but the rooms are larger, and an extra bedroom takes the place of the linen-closet. In the largest houses bath-rooms with hot and cold water are provided. During the last couple of years cottages of a somewhat different type have been built ; these have only one large living-room instead of the two smaller ones, three bed-rooms, and in some cases an attic. The various types and groups of the dwellings may be gleaned from the illustrations.

In order to limit the density of population, it is stipulated that no dwelling or other building must

occupy more than one-fourth part of the site upon which it is erected, and that about one-tenth of the land, in addition to roads and gardens, must be reserved for parks and recreation grounds. It was at first intended to sell the sites and dwellings outright, and by that means create a class of small freeholders. It was, however, found subsequently that such a mode of procedure was open to many objections, among them the difficulty of insuring that the property thus sold would be administered by the holders in the spirit of the Trust; it was also found that the element of speculation, thus laid open, was taken advantage of, some of the dwellings having been disposed of at profits amounting to something like 100 per cent., thus defeating the object aimed at—the provision of industrial dwellings at moderate rental, or its equivalent. The plan was, therefore, not continued, but, instead, it was decided to sell the dwellings and to let the land on leases of 999 years, subject to a ground-rent, coupled with the insertion of covenants in such leases, by means of which the accomplishment of the intention was secured. In this relation, it would appear, the system embodied in the scheme referred to in relation to the Ealing tenants community possesses certain advantages, for in that case something more tangible than a contentious covenant—namely, the holding of the share-stock of the tenant by the lessors—is in hand

for the enforcement of the objects and the proper maintenance of the property thus disposed of. Originally, in order to assist those who wished to become owners of their dwellings, but who had not sufficient capital, mortgages were granted, the money being advanced on the most favourable terms, to those who paid less than half the purchase price the rate of interest being 3 per cent., whilst to those who paid a moiety or more 2½ per cent. only was charged. It is obvious from this the class of tenant differed from that of operatives, and hence the arrangement, satisfactory in some respects, was found lacking in others, being open to some of the same objections that applied to the sale of the freeholds. It has, therefore, been discontinued, the remaining dwellings being let to weekly tenants.

There is much to be said in favour of suitable facilities being offered for the acquisition of their homes by operatives : it reacts beneficially upon the employer by lessening the incentive for change upon the part of his work-people, whilst—and this is far more important—the 'pride of possession' in the sober and conscientious operative affords the most potent incentive to him to take an interest in his home, to beautify it, and to add to it in his spare time many pleasurable attributes and means of passing pleasant and profitable time in and about his home. It tends, moreover, to cause him

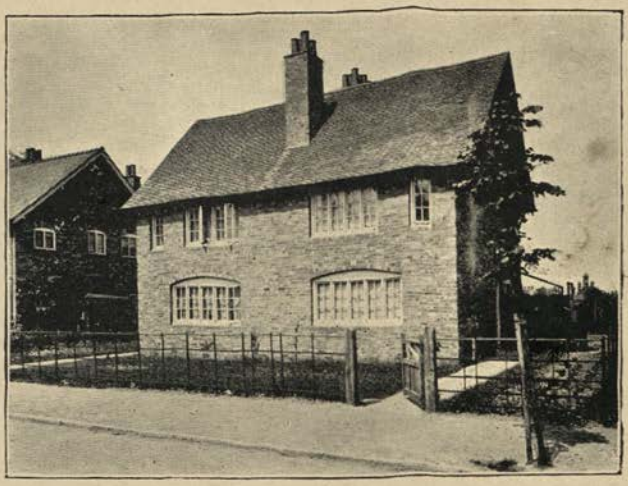
to take greater interest in his factory work, in order to insure permanency.

I cannot, therefore, too strongly draw attention to the value of the 'tenant-shareholder' principal involved in the joint-ownership by operatives of the streets of dwellings forming their village, for it is obvious that manufacturers would be only too pleased to forward the worldly advancement of such of their operatives whose behaviour may have commanded their confidence, by advancing on their behalf to such co-operative schemes the small sums requisite to enable their workmen to become 'tenant-shareholders,' such sums being repayable to the factory-owners by prearranged deductions from their weekly wage payments. Such advances would, needless to say, only be made to operatives who *had* inspired such confidence and respect. The advancement of such sums free of interest, indeed, might be made as a bonus paid to such example-setting operatives, in recognition of their exemplary behaviour and sincerity in the fulfilment of their duties. A thousand pounds thus advanced by an employer, in conjunction with a registered co-operative building society formed on the basis already explained, would not only produce 100 tenant-shareholders, but, were it coupled with a guarantee of rental for a reasonable term, would bring about the building of some £25,000 to £30,000 worth of industrial property. This, be it noted, without

calling for any expenditure upon the part of the City, would at once produce a revenue to it as the ground landlord, the operative-tenants being the house landlords and participating in the surplus obtained from the rack rentals.

The basis of ground-rent return at Bourneville is £20 per acre. Let us see the effect of carrying out this scheme of tenant-ownership in regard to a Garden City—such as the 'First Garden City,' the pioneer company for which have acquired the requisite area at agricultural value. In this case it is obvious—the agricultural rental varying from 18s. to 40s. per acre—the increment—I will not append an adjective to it, for, seeing that such increment would accrue to the community, they will doubtless find it convenient to omit the offensive and usually untruthful appellation, 'unearned'—this increment, I point out, would amount to from *one thousandfold to two thousandfold*, which would indeed be a handsome return even after amply adequate allowance for cost of road-making, drainage, etc., especially if the system I venture to advocate of hexagonal plotting be resorted to. In other words, the gross civic revenue from it—say, 500 acres of village area—would rise from about £500 or £1,000 per annum to £10,000.

Adverting for a moment to the 'gardens' attached to each dwelling, it has been found that the allotment to each of an area of 600 square yards has had the most happy results. These



Semi-detached Cottages.

Semi-detached Dwellings.

Grouped Cottages.

Grouped Dwellings.

Corner Cottage in Bournville.

Half-timber Shops at Bournville.

Views of the Village Hostel, Bournville.

Grouped Dwellings at Bournville.

Grouped Dwellings at Port Sunlight.

Grouped Dwellings at Bournville.

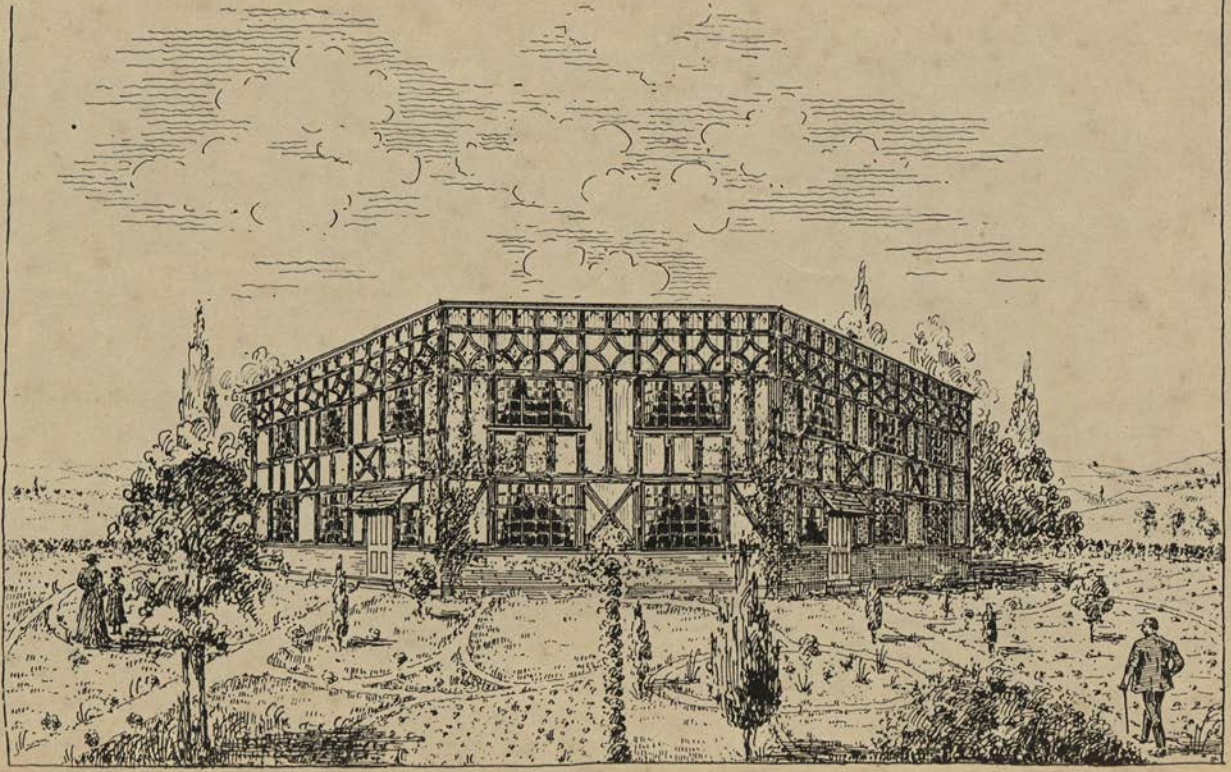
gardens are laid out by the estate gardeners when the houses are built, so that upon a tenant taking possession he finds the garden already prepared—a procedure I have already advocated should be adopted in regard to Garden Cities, instead of his having to be called upon to break up uncultivated land. The gardening accounts have been most carefully kept through the cheerful co-operation of the tenants with the authorities, and this surprising result has been proved to accrue—that the average net return, after deduction of all outgoings, per cottage (of 1s. 11½d. per week) is equivalent to a return from its cultivation of *no less than* £59 8s. 8d. *per annum*, as against a previous return from the land under ordinary methods of farming of *less than £5 per acre.* In other words, the yield of the 77 acres of land up to the present put under 'garden'—or 'intensive'—culture, *has risen from £385 per annum to the large sum of* £2,585 7s. *a year, an increase of vegetable production at the rate of* 600 *per cent.*, providing fresh and healthy edibles for the population of 2,000 inhabitants. For villagers who desire a larger area of garden, land allotments are provided, their rental being at the rate of 6d. per square rod.

The cost of the dwellings, types of which are shown in the illustrations, is from £183, including the laying out of the gardens, to £250, the rentals, as already stated, varying between 5s. 6d. and 12s.; those let respectively at 5s. 6d., 6s. 6d., 6s. 9d.,

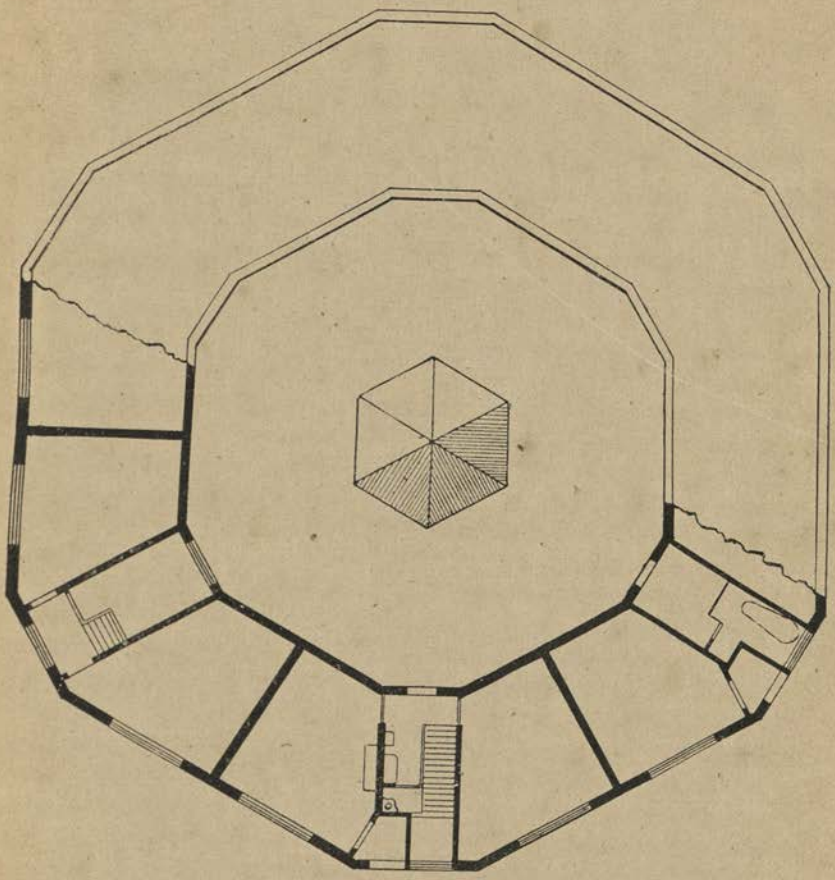
7s., 7s. 3d., 7s. 9d., 8s., and 8s. 6d., being rate-free; above those rentals the rates are payable by the tenants. The rentals are fixed so as to yield a net return of 4 per cent. on capital after providing for ground-rent, rates and taxes, repairs, management, and all outgoings. The area of land allowed works out at six dwellings per acre, a house density I have taken as my standard for my proposals in regard to the Garden Village of the Hertfordshire Garden City.

Further economy results from grouping industrial dwellings in larger numbers than four, but after six has been reached the proportionate increase in economy becomes very small. It therefore occurred to me—having advocated the hexagonal division of the land—to try the effect of hexa-multiple dwellings upon hexa-multiple gardens. My object is not only to effect economy in the dwellings, but also in regard to their yards, drainage, water-supply, and sanitary arrangements, combined with certain social conveniences and advantages.

It usually happens that advantages accrue from the increase of scale upon which almost anything is carried out or carried on. The great advantage of carrying on industrial occupations upon the large scale is that it affords the opportunity of reaping advantage from labour-saving devices and the economies to be derived from the use of machinery and motive-power. In no operation has this made itself more apparent than in the common



Hexa-multiple Dwellings.



Hexamultiple Dwellings—Plan (Half in Section).

PLAN OF HEXAMULTIPLE ARTISAN DWELLINGS.

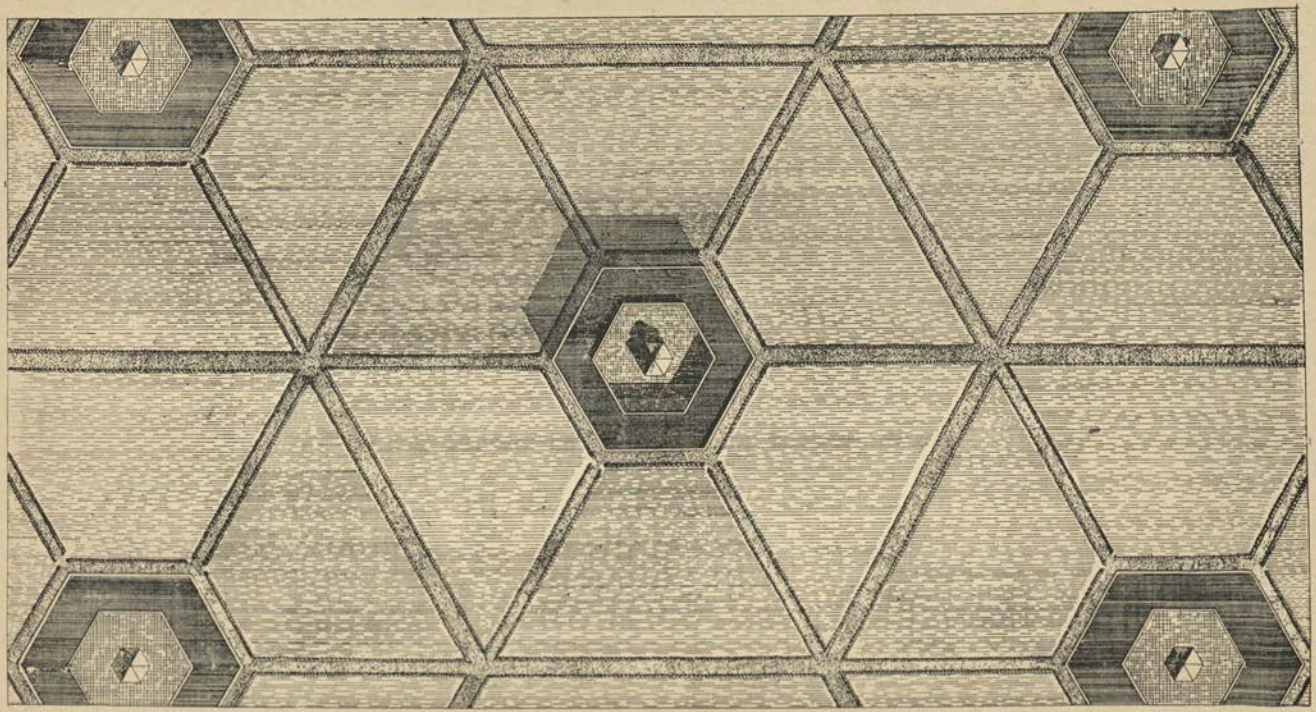
The hexamultiple building shown would stand in the centre of a hexagonal plot of land comprising exactly one acre. It would be tenanted by six families, so that each would have one-sixth of an acre of land. For this purpose the hexagonal building—which, by reason of its having its corners chamfered, becomes an irregular duodecahedron—comprises six distinct houses. Each house consists of a living room, scullery, entrance lobby, bathroom, w.c., and one bedroom on the

ground floor, with two spacious bedrooms and a smaller one, or store-room, on the upper floor. By a slight modification in the arrangement of the interior doorways, each may comprise two living-rooms on the ground floor, with three bedrooms above.

These are for family dwellings, but a similar arrangement may be adapted for bachelors or smaller families by arranging the apartments as flats. The accommodation would then consist in each case of a spacious living-room, a bedroom of the same size, and one of smaller dimensions. Or, again, the tenements of lesser accommodation may be so arranged as to have the living-room on the ground floor. In the two latter cases the hexagonal building affords twelve complete sets of tenements.

In the case of bachelor artisans—in order to reduce both the rental and the amount of house labour—the bathrooms and the w.c.'s would be placed in the hexagonal building shown in the centre of the yard—which building in the case of the family hexamultiple dwellings would be the joint wash-house. These jointly occupied detached buildings would be supplied with cheap fuel-gas, and hot baths could be obtained therein without the trouble and expense necessarily attendant upon the employment of coal fires and boilers.

The roof of the dwellings would consist of a concrete floor protected by parapet walls on the inner and outer sides, and it would be laid out as a flower-garden. An exterior iron staircase would give access to the roof, and this staircase would continue down into a basement passage, through which access to the yard would be obtained and all refuse removed.



Plan of a Group of Hexamultiple Dwellings, with their Gardens.

and necessary everyday labour entailed in the washing of clothes. In lesser civilized countries time has done little in mitigation of the arduous and incessant work of washing clothes by hand. One has only to journey through Italy and some parts of France, there to watch the violent and, to our way of thinking, headache-producing method of washing clothes, depicted in the illustrations, to appreciate this. For, seldom can one cross the course of the clear, intermittent, and boulder-bestrewn water-courses without seeing that quaint and truly continental picture formed by groups of women, young and buxom, old and wizened, kneeling on bits of sacking, bits of board, or upon the gray, rounded boulders themselves, clad in the most varied of garbs, and with the queerest head-gear, all with heads hanging down, bobbing and wagging, as they belabour with might and main —and ofttimes with large shovel-shaped pattens —but very little soap, the most heterogeneous of *habiliments*, the while clattering away in their fascinating language.* Who among us remembers not the grating sand to be found between the snow-white sheets?

The British housewife, albeit she does not perform her 'washing-day' task in the semi-inverted position shown in the illustrations, nor by taking pedestrian exercise in the washing-tub, as do her Scotch sisters, yet finds 'washing' not only a tax

* 'A Glimpse of Fair Italia,' by the Author.

upon her muscles, but also upon her time. In the latter relation, women who have to work in mills and factories must feel this still more keenly, with the result, it is to be feared, for it is but natural, that many a wanted change of linen is deferred. In connection with the hexa-multiple dwellings I venture to suggest, it would appear an excellent opportunity presents itself for not only effecting considerable economy in the provision of washhouses—the lead-like alacrity of the average plumber having caused these requisites to become so costly as to largely defeat their wanted provision to his brethren—but also very material convenience and economy of both time and labour in connection with the work of clothes-washing itself.

My proposal is that, in place of *six* separate washhouses, *one* of larger dimensions and better appointment should be provided and erected at the centre of the hexagonal yard.* Space prevents my enlarging upon this proposal here, for it is obviously one upon which much thought might be profitably expended, seeing that such agglomeration would render it possible to employ labour-saving and time-economizing devices, such as washing-machines, mechanical wringers, and such-like. I have elsewhere adverted to the great wastefulness of domestic fires and small-unit methods of heating water. It might be practicable, in connection

* In conjunction with which I would also suggest the latrines, corresponding to the dwellings, should also be built.

'Washing'—in Italy.

'Washing'—in Switzerland.

Clothes drying in an Italian Thoroughfare.

with such jointly-used washhouses, to arrange for the supply of hot water at an economical rate with a very material reduction in household labour—a point of much moment in regard to 'factory hands,' for whom the loss of time in kindling fires in the early morning is a great consideration. In connection with the blocks of dwellings for unmarried men and girls, where the number of inmates would so greatly exceed those of the hexagonal groups of dwellings, it is obvious such joint-laundries would prove of still greater value.

With regard to materials, it is certainly not flattering to the 'pride of progress' to find ourselves using to-day in the building of our best houses similar material to that used by the ancient Egyptians for their commoner dwellings. The common and absorbent brick is but a small remove from the mud-built domicile of the early Briton. The disadvantage from the point of view of health under which he laboured was the dampness due to the swamps surrounding his dwelling without, together with the humidity and rheumatism-inviting dampness brought about by the water-absorbing properties of the material of his domicile within. We to-day have obliterated the swamps of our country in such parts as we have chosen to build our towns, but we have done little towards mitigating the interior dampness of our dwellings brought about by the water-absorbing capabilities of the bricks with which we continue to build them.

The general reader may be surprised to learn the bibulous capabilities of the average British brick. I have therefore made quantitative experiment in this respect, the result of which I give in the footnote.* The practical effect of this may be gauged if we apply the results of the experiment to an ordinary dwelling. Let us take the case of a house, say, 60 feet high and 40 feet square at the base. The weight of such a house may be taken as being about 1,700 tons. Supposing the bricks of such a house, after a succession of rainy days, to absorb up to their full capacity; then it is clear that the weight of the water occluded within the walls of the dwelling would be upwards of *seventy-eight* tons.

On the cessation of rainy weather the whole of these 78 tons of water have to be given back to the atmosphere, and it is obvious that *many hundredweights* of such water, in the form of invisible vapour, will be absorbed into the draperies and bed-clothes within the house, as also the clothing of the inhabitants, as well as into their lungs. How deleterious this is to health needs not to be expatiated upon.

The difficulty is, however, at once overcome if

* Actual Weight of—	When Dry.	After Submersion.	After Prolonged Submersion.	Percentage Increase in Weight.	
Common Brick...	4 lb. 15½ oz.	5 lb. 12 oz.	5 lb. 14 oz.	15·7	18·1
Good Brick ...	6 ,, 9½ ,,	7 ,, 4 ,,	7 ,, 6 ,,	10·0	11·9
Staffordshire do.	8 ,, 5 ,,	8 ,, 7 ,,	8 ,, 7 ,,	1·5	1·5

Fluvial Washing, as practised in France and Germany.

glazed bricks be employed, and these set in Portland cement or siliceous mortar. The element of expense, of course, comes in. This, however, has hitherto been allowed to militate too strongly against the use of such valuable building material. It may be taken that the price of glazed bricks is three times that of ordinary bricks ; but then this only applies to the facing bricks. Taking a villa residence of, say, the size referred to, it may be assumed that the cost of the outside bricks in such would be about £128 if they be good red bricks ; now if glazed bricks were used, the cost of the house would be increased by £256. Consequently the increase of rental due to interest at 5 per cent. would be, say, £13. But then, as a set off against this, it may be said that we have reduced the cost of upkeep and redecoration to nil, because the very rain which, under ordinary circumstances, gives rise to the trouble would in this case play the part of decorator.

The insanitary nature of houses constructed with porous material is, of course, a matter of very vital importance in our own country, more so than in other lands blessed with drier air and a lower average rainfall. It had not escaped the notice of hygienists, and stucco or cemented dwellings are advocated by them. At one epoch such a mode of building was largely resorted to, but in towns such mode of building has left much to be desired in regard to appearance. Modern æsthetic taste has

caused them to be discarded in favour of plain, especially red, brick. How greatly would the cheerfulness of our towns be enhanced if these bricks were principally in white, ornamented and embellished with 'stringing courses' and other ornamentation in coloured bricks—now made very perfectly—enriched again with ceramic plaques, medallions, mouldings, and such-like; all such being now within our financial reach!

In the experiments I have referred to it will be noticed that the absorbent property of Staffordshire brick was far less than that of the ordinary stock-brick, for the reason that, being a kiln brick, and not 'burnt' (*sic*) in the grotesquely crude manner so prevalent—that of warming huge *open* stacks of bricks by interlading them with refuse to which a small quantity of coal has been added, in a most inefficient and uneconomical manner—the silica is caused to 'run,' *i.e.*, to be fused, thereby producing a partial glaze on the surface of the brick. This fusion, moreover, takes place within the body of the brick, and hence its hygroscopic properties become greatly reduced.

The means being at hand, it is truly surprising that no attempts have been made to produce a really impervious brick, the more surprising because simple remedies are available for the mitigation of the trouble arising from water absorption in bricks, a defect having as a result the bringing on of chronic rheumatism, sometimes leading in turn to

other serious maladies. An antidote, for example, is to be found in the washing down of the exterior walls with any appropriate solution capable, by chemical combination with the brickwork of the building, of producing a partial glaze, thereby reducing to a most surprising degree the amount of water absorption the bricks remain subsequently capable of.

The importance of this matter in our islands is enhanced by the fact that it is not even necessary that it should rain in order that the bricks shall become damp; they may, on the other hand, become damp by catalytic transfusion from the humid atmosphere and endosmotic action between it and the drier inner air, whilst by capillarity due to their porosity the bricks may become almost saturated even by mist and fog.

Now that we have reached that point of common-sense that we have commenced to mould our bricks in metallic moulds, instead of in rough wood boxes, and when sufficient of the same requisite, yet so often absent, common-sense, upon the part of the brickmakers, has been brought to bear that we find them commencing to bake their bricks in ovens instead of in the open air, there would appear to be reason to hope that brick manufacturers will ere long invoke the aid of the chemist, and produce that article so much to be desired—a *non-absorbent brick*.

Whether this shall be the case or not remains to

be seen, but happily we now have at our command another means of getting over this very serious shortcoming in regard to the materials of construction of our dwellings. It often happens, as I elsewhere point out, that in striving to compass one end by mechanical or chemical means, though we may fail in our predetermined course, we may consummate some other new and valuable innovation. In regard to the subject now under consideration—the necessity for improving building material—far more attention has been bestowed upon it and far more enterprise evinced abroad, notably in Germany and the United States, than with us. The goal to which investigation and experiment has been directed has been the manufacture of artificial stone. I must not, however, forget to mention the fine work done in our own country by Ransome, who produced artificial stone as long back as 1837.* In all the processes for making artificial stone of the much-sought-after kind—namely, silicate-of-lime stone—a difficulty, which for something like three-quarters of a century proved quite insuperable, was the fact that albeit the material produced was perfectly satisfactory, it was impossible to produce it without cracks and flaws, the elimination of which gave rise to serious wastage, amounting to one-half or two-thirds of the product. The consequence of this has been that the various manufactories, of which there are a considerable number in Germany, have con-

* The buildings erected with this successful material have been referred to by architects as 'monuments of durability.'

fined their attention to the manufacture of 'stone-bricks,' a valuable commodity hitherto not procurable in our country. Quite recently, however, strenuous endeavour and persevering experiment, spread over the last three years, have resulted in a perfectly successful solution of the problem of the production of not only cheap stone-bricks, but cheap, perfectly homogeneous and beautiful artificial stone, a circumstance of which the builders of Garden Cities may now take advantage.

So much in regard to the *material* forming the major portion of the walls of our buildings. A few words as to the mode of their construction. I have elsewhere mentioned that the watchword of the engineer is 'simplicity,' and the first principle of simplicity is the reduction in the number of parts. Time immemorial has done scarcely anything to reduce the number of parts going to build up a house.

In building a piece of machinery, the engineer reduces the number of parts to a minimum; he, moreover, takes the most elaborate precautions that the various parts of its anatomy shall be touched as little as possible by hand. In a modern engineering works, such a thing as *lifting* by hand any portion which may weigh anything exceeding a few pounds is never seen; it is much more economical to do it mechanically. By reason of these facts, an engineer, standing and watching the building of a house, appreciates that almost every-

thing he sees going on is done wrongly from the point of view of economy. He sees tiny morsels of the great whole to be built up being handled *separately* by a pair of human hands. He sees these tiny units placed—in small quantities at a time—in hods made to be carried on human shoulders; he sees—oh most unscientific proceeding! that for every *few pounds* 'dead' weight of bricks carried up a tall ladder a *large number of pounds* of 'live' weight—of flesh and bone—are also carried up to the top of the building, and this *quite uselessly*. Nay! doubly so, for, before another few pounds of bricks can be thus muscularly hoisted, the muscle and bone must itself descend to *terra firma*, thus completing perhaps the most inefficient and uneconomical cycle of operations one can possibly call to mind. This will be better understood if one reflects upon the figures given in the footnote.*

* Taking the weight of a labourer as 168 pounds (12 stone), his hod as 4 pounds, we find that the weight uselessly raised each journey is 172 pounds. Confining ourselves to the second story of a house of the size, for example, of that mentioned in regard to the Grand Promenade—viz., 40 feet square—the labourer would have to make no less than 1,827 journey in order to carry up the bricks required only for that story. Now the total weight of the bricks the labourer will have raised to the mean of the second floor level will be 1,370 hundredweights, whilst the energy necessary to raise this weight through this distance is 4,603,200 foot-pounds, or 140 horse-power (139·5)—that is to say, a steam-crane by developing 140 horse-power would have been able to have raised the bricks. But we shall

It is only within the last few years that one has noticed the employment, in house building, of the rope and roller—known to the Egyptians—and the rope, wheel, and basket—made use of by the Greeks—for hauling bricks and mortar up to different tiers of scaffolding; it seems incredible, but these are facts. It is only within, say, the last decade that we have seen the common-sense

find that the labourer will have had to expend a much larger amount of energy than the steam-crane, for on the completion of his task he will have made 1,827 journeys. Now, the mere making of these journeys, without carrying any load, will have cost the man—when on the ladder alone—a matter of 9,427,320 foot-pounds, or *two hundred and eighty-six* (285·6) horse-power. We thus see and appreciate the remarkable fact that the labourer does three times as much work as the steam-crane, also that twice as much labour is expended uselessly in raising his own body as is necessary for lifting the bricks.

Perhaps no finer example could be cited anent the enormous value of applied science in regard to labour-saving devices than the immense saving of labour the invention of the hydraulic 'jack' was enabled to effect in the raising of those interesting monoliths known as Cleopatra's Needles. It is probably not known how many hundreds or thousands of slaves were employed by the ancient Egyptians in raising these monuments. It is, however, known that Fontana, in 1586, raised an obelisk in Rome by means of 40 capstans worked by 75 horses and 960 men. No less than 480 men, working 10 capstans, were required by Le Bas in raising the Luxor Needle in the Place de la Concorde, Paris. When, however, our own Cleopatra's Needle was landed at the Thames side, thanks to the skilful engineering of Mr. John Dixon, M.I.C.E., *four men* only were required to raise this enormous mass (something like 200 tons), because they had at their disposal four small Tangye hydraulic jacks.

arrangement adopted of first building your derrick and then your house. As we journey through the streets of London we *now* commence to see with pleasure, rearing up from behind the hoardings of clearances, light triple timber towers. Upon a platform constructed upon these, in due course, a steam-crane makes its appearance, and the economy, to say nothing of the expedition of work, by this is surprising. Strange that one should have seen it already for so many years in Paris. Instead of hodsmen laboriously climbing vertical ladders with mere driblets of building material, we occasionally see whole cart-loads of bricks, timber, mortar, girders, and other material whirled swiftly up on high, dexterously gyrated, and deposited at the feet of the workmen. This, be it mentioned, is usually done by means of a *steam*-crane, a motor appliance, which adds its quota of smoke and steam and dirt to the already well-laden London atmosphere.

The general reader may well ask, 'Why should not all this work be done by electricity, seeing that at length electric mains are to be found in all our principal thoroughfares?' The reply would lead us to a technical subject upon which we must not here enter, but nevertheless the reader is entitled to a reply. It is due to that failing of British manufacturers the *want of standardization*. Hence we find that the pressure of electricity in one street is quite different to that in the next, that one is a

continuous or uni-directional current, that another is alternating, that one is this phase and another is that multi-phase, the result being that we cannot use electrical cranes without each contractor being called upon to keep such a variety of them, in order that he may suit his motors to the various supplies of the various districts, as to be wholly prohibitive. Happily the standardization movement, now that millions of pounds have been wasted, is receiving the most serious attention at the hands of the proper authorities, such as the Joint Committee of the Institutions of Civil Engineers, Mechanical Engineers, Electrical Engineers, and other scientific bodies.

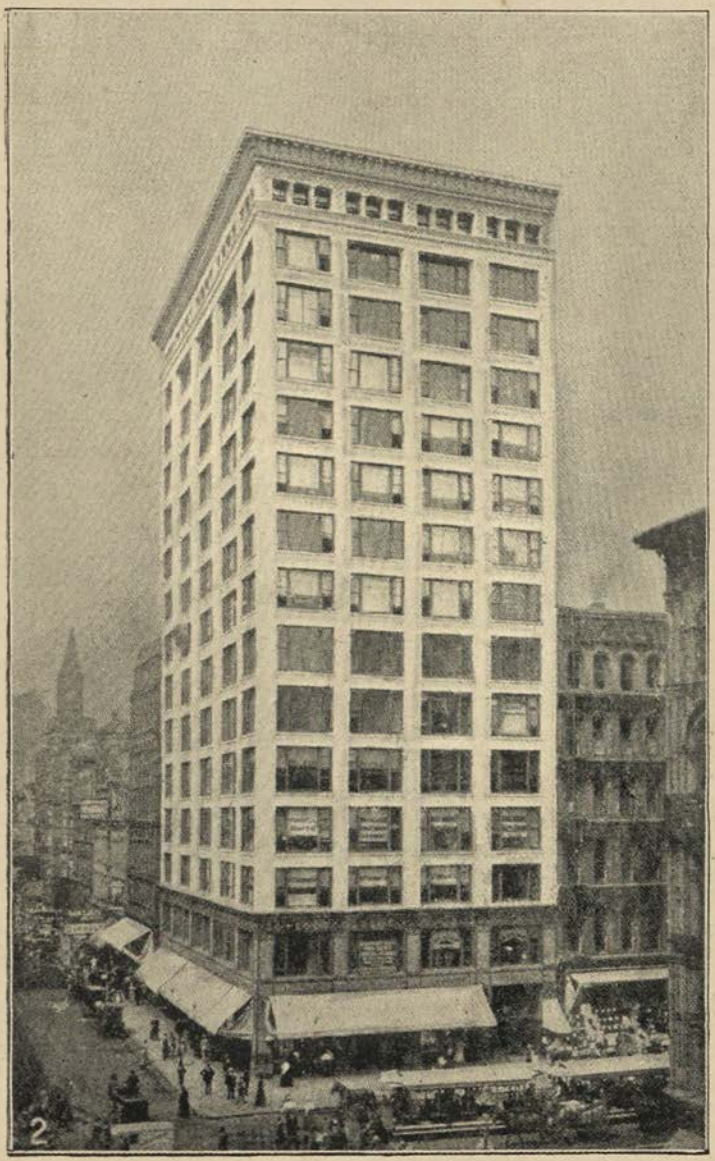
Having now all too sluggishly got our material into position, my remarks shall be confined to a brief reference to the putting of it together. To take the case of a dwelling such as that already referred to, this will be found complete in regard to its walls only after the laborious putting together of some *forty-eight thousand* separate pieces. One would stand aghast if one were told that one had to build up a piece of machinery with some 48,000 parts. What, then, does the machine constructor do to prevent the piecing together of so many individual units? He first builds a model of that which he wishes to produce, in such wise that the finished article shall consist merely of *one* piece. Of this model he makes a mould in material no more stable than sand, and, pouring his molten metal into this, he

finds on removal of the temporary mould his construction complete and in one piece. We have, therefore, to ask ourselves the question, especially in relation to the building of a Garden City, where a number of similar buildings are to be put up at one and the same time, if the day has not arrived when a lesson can be taken out of the book of the engineer.

I think the answer is in the affirmative. In place of the 'mould' of sand used by the iron-founder, the new system—usually known as the American system — of steel-girder construction should be resorted to. By this means the builder, so to speak, builds his pattern ; this, in place of submergence in sand, he may temporarily enclose in timber damming, and into this he pours the metal—viz., concrete—which is to form the building. In a short time—like the founder removing his sand—he, too, removes his timber mould, and there he finds his walls and his ceilings *absolutely fireproof and hygienically perfect, and all in one solid and rigid piece.*

We have now arrived at the roof. What of this !—as carried out in ordinary practice ? Here we have the same antiquated system—the aggregation of an enormous number of separate pieces laboriously prepared and skilfully emplaced. A roof is intended to preserve warmth in the house, and to prevent rain from entering it. Nothing can be worse calculated to fulfil these *desiderata* than our ordinary roofs. To keep our bodies

The American System of Steel-Girder Construction. A 'Skyscraper' in course of erection.



A 'Skyscraper' completed.

warm we don a *thick* overcoat; to keep our houses warm we use a *thin* material, and this of the most friable and breakable nature. If we have to carefully protect and keep dry merchandise—as, for example, in a railway waggon—we furnish the latter with a cover *made in one piece*, and we, moreover, take great precautions that such piece of covering has in it *no cracks nor crevices* or other small openings. To keep our houses dry, we put over them a covering containing *thousands of cracks, crevices, and small openings*, and these cracks and crevices are arranged at an angle so that their sharp edges are offered to the strong pressure of tempestuous winds, whereby the rain is easily and speedily driven through them to stain and sully the erstwhile spotless ceilings, and to carry colds and rheumatism within our dwellings. It may truly be urged that we have a counterpart of slate and tile roof construction in the feathers of birds and in the scales of fishes; but this is untenable, for the analogy is an imperfect one by reason of the fact that these numerous *laminæ* were there provided in order to compensate for *motion* of the surfaces upon which the feathers or scales are mounted. Now, in regard to the roof, motion is the thing we desire most strongly to prevent.

Here, then, again I would ask whether the time has not arrived for the introduction of a better system of roof construction; put in other words,

whether the earthy material which is fixed to our roofs in such circuitous fashion—viz., by being first dug from the earth, moulded into small pieces, dried, baked, carried to the top of the building, and then nailed upon it—could not be got there in a manner much more expeditious, and emplaced in such wise as to be much more efficiently useful when it shall have reached its destination. Obviously, here, again, the answer is in the affirmative. We have only to continue our steel construction to the roof, provide it with a temporary platform beneath, pour upon it the earth in form of sand, stones, and cement, leave it to harden, and there we have our roof.

A roof of this solid construction would indeed be worthy the name—a roof capable of keeping the house warm in winter,* cool in summer, and perfectly dry; a roof, moreover, capable of multifarious uses which the ordinary roof—a touchy subject, which has to be treated with studied care, and upon which the foot of man must never be directly placed—is quite unable to perform. In this, as with so many other things, we find the foreigner ahead of us, especially the German; a circumstance doubly interesting from the fact that it is he who longest had held stolidly to the charming steep-angled roofs, covered with timber, shingles, and studded with quaint 'Dormer' win-

* See also reference to bedrooms.

Roof Gardens.

Work and Fresh Air on the Roof.

Hospitality on the Roof.

Floriculture on the Roof.

Meditation on the Roof.

dows. But the Teuton is ever ready to apply the dictates of science; he is also ever ready—unlike ourselves—to seize every opportunity for *al fresco* entertainment. Thus we find flat roofs obtaining in Germany; thus we again find them utilized as gardens. Some of the Berlin roof-gardens, indeed, are most elaborate. I am enabled to present reproductions of four typical ones, which I feel are most interesting, not only intrinsically, but because there is every reason to suppose that such gardens will make their appearance in Garden Cities.

This practical carrying into effect of a thoughtful, common-sense and economic idea constitutes, in fact, a partial fulfilment of a day-dream of one of our own revered men of science. My reference to it shall be in his own words:* 'In all large towns the roof of the house should be a garden. I have shown elsewhere—in an essay on "Upper London"—that if all London houses were built of uniform height, and if the roofs were turned into long and beautiful terraces with walks in the centre, flowers at the side, and cross-bridges to connect streets and squares, the whole Metropolis would be transformed into a physical paradise. The traffic of the crowded streets would be relieved; the arrangements for postal and telegraphic deliveries would be immensely facilitated. The means for extinguishing fires would be so ready at hand as to render large fires practically impossible,

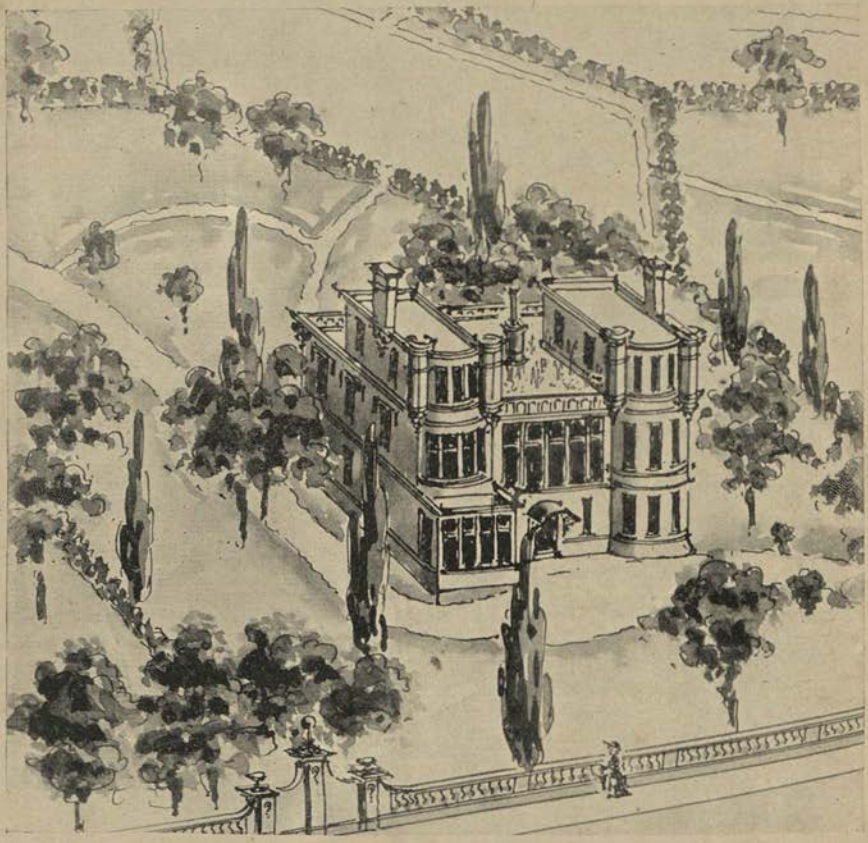
* Those of Sir B. W. Richardson, F.R.S., written about a quarter of a century since.

and the health as well as the happiness of the vast population would be improved beyond anything of which at present we have a conception. There would be no smoke, for that would be consumed with the utmost facility in furnaces constructed on the terraces for the purpose; there would be all the richness of trees and flowers overhead; there would be pure light, pure air, and splendid scenery at the command of every citizen, young and old. Upper London would, in fact, be London in the country.'

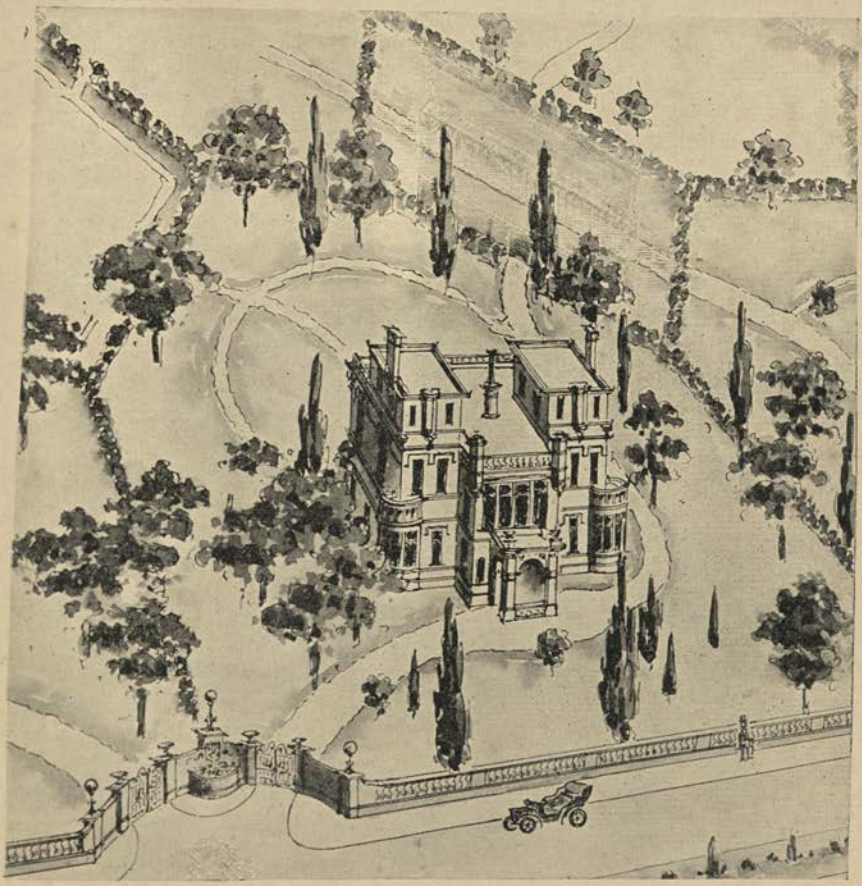
'I shall not live to see this idea fulfilled, but fulfilled it will be. I refer to it in this place and in this every-day essay in order that my readers may dream of it as I have done, and may help forward its development in all great centres where multitudes congregate and live together.'

It might be thought, *primâ facie*, as ample provision for gardens will be made in Garden Cities, coupled with the fact that the restriction of population in each will efficiently prevent the overcrowding of streets, that careful consideration of the employment of flat roofs need not be entered upon. This, however, is not so, for, apart from pleasures, they would have much to say in regard to the health of the inhabitants, and I would, therefore, beg the reader to bear with me to the extent of weighing their influence upon health in regard to the important subject of kitchens and bedrooms.

The question, of course, might be asked whether a flat-roofed house can be made as ornamental as



Bird's-eye View of a House in Grand Promenade.



Bird's-eye View of a House in Grand Promenade.

an acutely pointed one. The answer is obvious; it is only necessary to choose for that purpose the correct style of architecture with which this particular type of summit contour will harmoniously assimilate. This is easily done, for we have not to travel so far as the Orient to witness the luxury-loving Oriental sipping his coffee and smoking his hookah, whilst catching such gentle zephyrs as may be moving upon the roof of his domicile, there comfortably ensconced on pillow and settee beneath a draped canopy, for we have only to consider the Italian style of architecture, as also the Grecian, and there we find that the instances in which the roof is invisible and surrounded by a 'coping'—which may easily be evolved into a graceful balustrading—predominate. Lest, however, there may still be doubt upon this point, I offer to the reader presentments of dwellings such as I propose provided with flat concrete roofs and certain other modifications.

Were we to analyze the *science* of 'building-construction' we should find it equally at fault. A house—whether it be built upon rock or, in defiance of the Biblical admonition, upon sand—is tied together and bound into one homogeneous mass, with nothing more tenacious than thin layers of mortar.* The bricks are so laid as to form a 'bond,' a good

* In the case of lofty buildings, and in the walls of warehouses in which heavy weights are to be stored, lengths of thin 'hoop' or ribbon iron are sometimes laid in with the mortar.

word in this relation, but of what real value is it under conditions deviating from the normal? Should a portion of a house sink—even but a few inches—the 'bond' of union is ruptured, the joints draw apart and 'gape,' and the bricks, being of but meagre tensile strength themselves, break in twain, and the fabric is 'cracked' as detrimentally as a china vase. One frequently sees houses, which have settled, embellished with a gaping crack extending from bottom to top; this arises from the defective application of science conjointly with the improper use of material. A brick is a very good thing to bear a load, it is a very poor thing to stand a pull.* *A priori* a brick should not be called upon to withstand a pull, as in present practice, for then 'the cracks' every prospective and 'prospecting' tenant looks round to find, will assuredly be found.

In the steel skeleton construction now being introduced the 'bond' is really that of steel, and if it be properly carried into effect the building becomes tied and bound together in all directions. How defective and wasteful of material and space the ordinary brick wall is, is seen when one reflects that the thinnest wall allowed by the Building

* The average crushing strength of bricks for every square inch of their surface is: for ordinary 'stock' bricks, 562 pounds; red bricks, 807 pounds; Staffordshire bricks, 1,000 pounds; whilst the tensile strength of brickwork scarcely exceeds that of the mortar, a brick, indeed, being torn asunder much more readily than a piece of cement.

Acts is *nine inches* thick; whilst it is said of a four and a half inch brick partition that 'one must not lean up against it,' yet a piece of mild steel less than an inch thick is capable of safely sustaining a pressure of *three or four hundreds* of pounds on *every square* inch of its surface. Obviously, therefore, if dwellings were built upon the 'metallic skeleton' system, these wastefully thick walls would be quite unnecessary, their place being taken by brick panelling and even concrete slabs.* By this means the cracking of walls would be prevented; damp walls, produced from conduction from the soil, could be entirely obviated by simply mixing the concrete of their lower portions with bitumen;† whilst, lastly, the time occupied in construction would be reduced in a most valuable degree. The latter point has, during the last year or two, been most valuably and gratifyingly exemplified in London by the remarkable—for our country—increase in expedition effected. In the case of large business premises this alone would probably more than repay increase due to the mode of construction. In Garden Cities the application of science to building construction could be made pro-

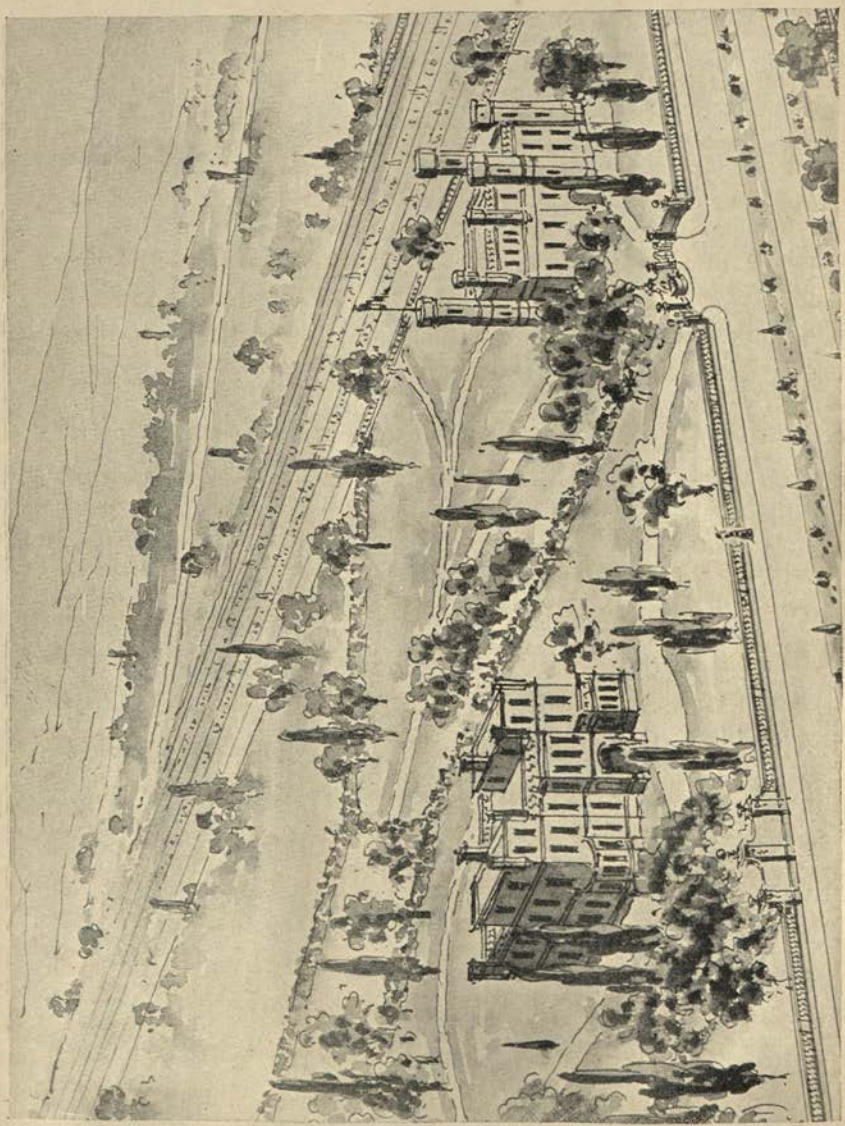
* It may be urged that one cannot indulge in driving nails into such in order to hang pictures, etc., but no one nowadays, with the thoughtful system of a suitably moulded 'frieze' rail and chain, would wish to do this.

† The ancient Babylonians, it will be remembered, prevented percolation from their 'hanging' or terrace gardens in this manner.

ductive of material economy. For example, the type of artisan and other dwellings having been decided upon as the best,* metallic moulds might be made of many of the parts of them, and these used in combination with steel-concrete construction in the manner I have explained.

In addition to the constructional and hygienic advantages to which I have adverted, there is another great and valuable attribute of concrete houses—namely, the quietude one may enjoy within them. Wooden floors of the ordinary construction supported upon wooden 'joists' or 'rafters,' as they are sometimes erroneously called, act in a precisely analogous manner to the 'sound-boards' of pianos; every sound made above is amplified and reproduced below. To prevent this great defect, various expedients have been resorted to, as, for example, putting in a complete 'damping' diaphragm by connecting the joists together at about half their depth by an open flooring of small battens, and then filling up the whole of the upper space with plaster. Even this is but a poorly efficient antidote, whereas the solid concrete construction is, under all normal conditions, noiseless.

* In cases where a large number of dwellings are to be built in order to combine variety with economy, the plan has been adopted of having various types, and building a number off each set of drawings, but subsequently so dotted about amid other types that their similarity becomes unnoticeable.



Houses in Grand Promenade.

CITY DWELLINGS

'Combine in the household all that makes the house healthy with all that makes the house beautiful. So shall body and mind be alike wholesomely nourished, and alike fitted for long and happy life.'—B. W. RICHARDSON.

THE health and happiness of a community and, it in a great measure follows, its prosperity, is largely dependent upon the dwellings inhabited. Perfect municipal sanitation could avail little if the sanitary conditions obtaining *within* the homes beat fault. Now, on what do the sanitary conditions of household dwellings depend? Neglecting considerations of nature of soil, surface drainage, and suchlike, all of which have been, or will be, looked after in the selection of the site of the town and its preparation for habitations, they depend upon (*a*) the manner in which the dwellings are built, (*b*) the skill with which the architect may have assimilated his art with the principles of science involved, and (*c*) the habits of the dwellers. The last I venture to touch lightly upon in the next chapter; the first is a matter which doubtless will receive careful consideration (with the imposition of judicious restriction in regard

to health-influencing details) at the hands of competent committees; whilst with regard to the applications of science and a few constructional details, I should like to be allowed to say a few words here. As to Art and design, there is little doubt our architects—with such a fair field—will render a good account of themselves.

It is sometimes asserted, in regard to the building of British dwellings—especially those of long years past, for it can scarcely be urged in respect to so many of our modern ones—that we have been in the habit of building ours *too* well and *too* substantially; that, moreover, we have not taken into account the progress of science and the necessity of change of style and design for compliance therewith. It must be admitted that there is much to be said in regard to the force of such argument; and this is strongly impressed upon one in seeing, for example, old types of 'basement' houses being pulled down in all directions to make place for those of more modern design. The sole attributes of the latter, and the reason for the demolition, is that the more modern style proves to be more *convenient* and more *healthy;* though constructionally the former may have been thoroughly satisfactory, and the materials, to use the builder's expression, 'seasoned and better than new.' Could we but eliminate the factor of human frailty, and insure the forthcoming of accumulated capital at the predestined time, we could perhaps arrive mathematically at the *proper length of time* a house

Drinking-fountains in Tile-work (Doulton).

An Interesting Example of Exterior Moulded Work.

House erected by Messrs. Doulton at the Paris Exhibition, 1900, and composed of surplus material and moulded work originally designed for their own offices and show-rooms at Lambeth.

should be built to stand, having regard to capital expenditure, cost of upkeep, depreciation, and a number of other points. To the Englishman, however, a dwelling for his own occupation is a fit object for judicious investment, whilst solidity is characteristic of the British. One would like to see the dwellings of Garden Cities in no way wanting in solidity; *ceteris paribus*, this points to the paramount importance of their design and construction being such as to permit of the embodiment of the hygienic and comfort-affording attributes of modern science, and the cumulative results of scientific research.

If we carefully consider the anatomy of a house and the mode of building it, we cannot but be struck with the very small amount of progress both invention and science have brought about in this connection. It would not be incorrect to say that for thousands of years (some 6,000 years as a matter of fact) houses have been built in a similar manner to that obtaining to-day—of bricks and mortar. It would be also true to say that, in a large majority of the houses we build to-day, the bricks are *inferior* to those of ages past, the mortar *far inferior* to that used by ancient Greek and Roman builders. As to beauty of design and majesty of appearance, there can be no question that here again quality has degenerated. The latter, however, is an architectural question, one, moreover, happily becoming rapidly rectified. Unfortunately improvement is

seriously hampered by a curious idiosyncrasy—perhaps exclusively peculiar to the industry of building—that is to say, with increase of production the entities have become *dearer*, instead, as is almost invariably the case, cheaper. That they did not become cheaper is due to the fact that mechanical assistance and labour-saving devices, until within the last decade, have—with singular rigidity—been ignored, nay! scouted. That they have become dearer is due to the fact that the workmen employed have only advanced in education so far as to be able to listen to the *pseudo*-doctrines enunciated by their union leaders, without being, as yet, to any material degree able to think for themselves, or to discern the disastrous, ay! suicidal results already befalling and which will continue to befall their country and themselves through their efforts to perform the *minimum* of work per diem, and thus produce buildings and other entities at the *maximum* of expense. This, unhappily, is a matter which must be left to those who have the opportunity of inculcating sounder principles, to education, and to general enlightenment, to bring about a change.

I have adverted to the fact that the introduction of mechanical processes in regard to building has been only to the most meagre degree. This has arisen from two principal causes—the single unit method of the erection of dwellings, and the opposition of the workmen—led by their unions—to any and every improvement and the use of labour-saving

devices and machinery generally. It would not be too much to say, that, had such opposition been allowed to obtain in regard to our textile and engineering branches of commerce, these industries would long ere this have been totally effaced from our islands. In regard to both of these, at first the greatest opposition and violence was offered, but the operatives came subsequently to see the mistake they were making. They found that machinery was prepollent *to expand employment* and to *increase wages*, and at the same time to provide them with *cheap* instead of dear clothes. *Non-unionist* engineers have *now* quite come to see that, if 'up-to-date' machinery and labour-saving devices be not resorted to, it is the foreigner, and not themselves, who obtains the orders and receives the wages. Unfortunately, the majority of our bricklayers have not yet been able to grasp the fact—a truism most strenuously kept from them by their union leaders—that labour-saving devices and more conscientious expedition of work upon their own part would provide them with dwellings at lower rentals. Although bricks have been laid for so long, it is only quite recently that one has heard anything of a successful 'mechanical bricklayer,' and it may be interesting to readers to mention here that such an appliance does now exist. I witnessed the working of the experimental 'bricklayer,' shown in the illustration, with a great degree of interest and pleasure, marred, however, by the reflection that its introduction will be met with the

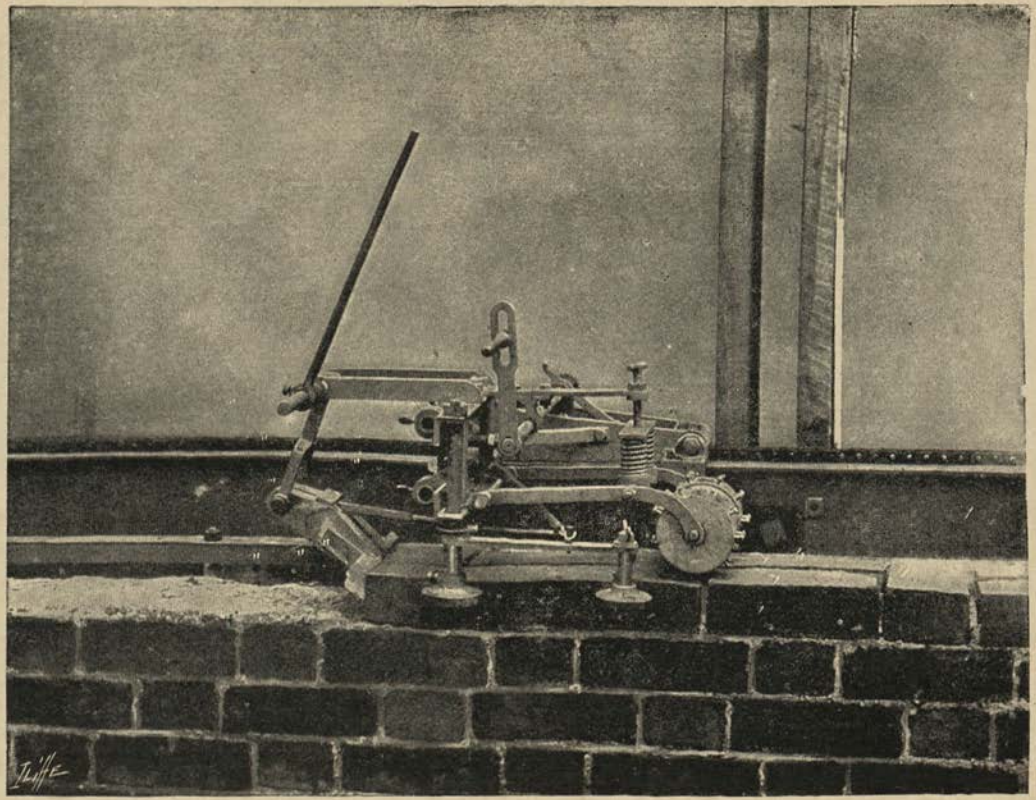
same short-sighted opposition as so many labour-saving devices before it—notably the linotype compositor—have met with even up to quite a recent date. The machine,* as will be seen, in doing its work, runs along a girder carried by the scaffolding in such manner that it can be quickly raised as the wall increases in height. In the illustration, the brickwork seen is the 'rough face' or inside of the wall. The mechanical bricklayer, it is claimed, will do the work of six ordinary bricklayers, and this at a cost of 16s. 8d. per day, as against £2 for the six skilled bricklayers, each earning 6s. 8d. per day.†

If we turn from material and mode of construction to design, then we see that the architect has done better work, from the point of view of progress, than the builder. It must be apparent to all that Art, in regard to the exterior design of our dwellings, is commencing to assert itself in most gratifying manner. I will not take up space by a reference to the pleasing transition, but instead present a few

* The 'mechanical bricklayer' is the invention of Mr. John H. Knight, of Barfield, Farnham, Surrey, an engineer to whom we are indebted for several valuable inventions, notably in connection with gas-engines.

† The cost of mechanical bricklaying is made up as follows:

	s.	d.
One bricklayer	6	8
One labourer	3	4
Loss of time getting ready to work (about)	5	0
Interest on £100 at 5 per cent.	0	4
Depreciation at 20 per cent.	1	4
Total cost per day ...	16	8



A Mechanical Bricklayer.

pictures illustrative of the revival in artistic treatment of dwelling-house exteriors. From the point of view of comfort, health, and happiness, the interior of our dwellings is of greater importance than their exterior appearance; nevertheless the latter is not a negligible consideration, for it must be borne in mind that where æstheticism has been studied, where becoming symmetry and mind-satisfying proportionment is found combined with pleasing harmony of a beauteous whole, the town thus favoured has a wholesome and much-to-be-desired tendency towards elevation of the mind.

'Art in the house' and the beautification of the interior is essentially women's work, and into their hands it may be safely confided. How much women's influence has to say in regard to happiness within it, needs not to be written, but it is 'Science in the house' who speaks most potently in regard to health; whilst, in regard to sickness, how much the physician's battle with disease is influenced by her also need not be written in these days of awakening acknowledgment of the inestimable benefits she daily confers. Science should be *en évidence*, in the first place, in the *design* of the dwelling, and in this relation it is gratifying to witness the exorcism of that unscientific disposition—that insanitary abomination —the *underground kitchen*. Whether it be due to the trenchant condemnation of hygienists or to the more universal awakening of common-sense, we have the satisfaction of seeing its gradual disappear-

ance; and most certainly a perpetuation in Garden Cities of this faulty design in household architecture would be wholly inexcusable. It may be argued, in regard to towns, that this matter—like so many others—is wholly dependent upon monetary considerations, an argument with which I for one am not in agreement. It may truly be said that the 'kitchen is coming upstairs,' for we now find it in all well-ordered country houses on a level with the dining-room; but in town houses is it yet as high as it should be? Nay! even in country dwellings of any pretensions would it not be better, more efficient, and more in accord with scientific dictates, were it still higher—on the roof?

Let us reflect upon this for an instant. If we banish the kitchen from beneath, we at the same time abolish another abomination and prolific source of pain and disease—the basement. In a basement it is almost impossible to obtain sunshine or freedom from cold and damp. By a perversity that is unpardonable it is common to floor the basement with stone flags lying directly upon the earth. The coldness thus produced and consequent chill to the feet and lower limbs of the occupants is lamentable in its results. 'If you go to the out-patient department of the dispensary or hospital of a large town,' says Richardson, 'you will soon be surprised to find how large a number of the patients there are returned as suffering from two diseases—consumption and rheumatism. If you ask the life-history of the sufferers,

you will be surprised again to find how many of them are servant-maids, or persons following some similar position in regard to residence. If you go a step further, to look into the cause of this, you will find that the grand promoting cause is *living in a basement*, the exposure there to the cold and damp and to the close air.'

It is not too much to say that, even in our very best town-houses, the condition of matters in regard to the sleeping-quarters of butlers, footmen, housekeepers, and such like is in many cases a scandal, having regard to the advances the last quarter of a century has seen in hygienic science. Not only the position—often in areas and beneath pavements—but also the cubical capacity of the cupboards in which these men sleep and the women have their 'living-rooms' is grossly at fault. The result is made apparent in the faces of household men-servants, whose appearance is almost invariably unhealthy.

Basements render it impossible to prevent the smell of cooking, the nauseating effluvium from 'green-water' and such-like, from ascending into the living-rooms, and, indeed, suffusing the whole house. Moreover, of all the rooms in a house, that which should receive the most light and the maximum of sunshine is the kitchen. The room of all the house, furthermore, the most difficult to ventilate is again the kitchen. Trouble from cold and damp is got over in country houses by installing the *cuisine* on

the ground-floor. But here it is in a most wasteful position, usurping the position more proper to a 'reception-room.' To get over this disadvantage it is usual to relegate it to a rear position—namely, the ground-floor of the ambiguously termed 'addition.' Here it forces a difficulty upon the architect in his endeavours to produce an ornate exterior. It forces him, as it has been facetiously put in regard to a now prevalent style of architecture, to furnish his dwelling with a Queen Anne front and a Mary Ann back. If the more scientific construction I advocate—namely, that of the solid and flat-roofed type—should obtain in Garden Cities, which it is intended should be more than usually ornate, then let us strive to prevent the appearance of Madame Majestic fronts with Mrs. Gamp backs, and this we shall have difficulty in doing if we adhere to the practice of furnishing them with those ugly excrescences misnamed 'additions.'

With kitchens thus located, it is found that the disadvantages appealing to the olfactory senses are but very slightly mitigated even with the provision of a swinging baize door, or—what is more up-to-date—a serving hatchway, whilst troubles arising from difficulties of ventilation and want of light and sunshine are also but very partially overcome. The health and pleasantness of life of domestics are certainly improved with this disposition of the culinary department, but in a measure by no means equalling what it would be were the kitchen built upon the

roof and surrounded by a trim roof-garden, affording a pleasant immediate outlook, with an equally pleasant vista of the country all around.

The kitchen, says our authority, 'should be thoroughly lighted, so that the cook may be able to see everything that she is doing. It should be so perfectly ventilated that no smell of cooking should be noticeable out of it, and very little in it.' Let the reader reflect for a moment, and he or she will say there is no position affording such facilities for the fulfilment of these important conditions as the roof. In the prevalent design of villa residences the kitchen window usually faces the wall of the 'addition' of the adjacent house; it is usually, moreover, opposite the range. This offers a triple disadvantage: sunshine scarcely ever enters; the major portion of the light is cut off before it enters; whilst the ample rotundity of the average English cook shuts off much of what remains whenever she approaches her range to inquire into the welfare of her baking or simmering charges. With a 'roof-kitchen,' on the other hand, the range can be conveniently placed at the end of the kitchen, and lighted by windows open to the direct light of day at both front and back. Moreover—and this is of the utmost importance—light and ventilation may be obtained by means of a skylight. Did one ever see a billiard-room efficiently lighted except by means of a skylight? Did one ever see a *cuisine* so perfect as that which would be presented by a solid erection

upon a concrete roof, having its walls entirely of white glazed tiles, above a dado of appropriately-coloured glazed bricks, lighted by means of a capacious skylight and ventilated directly from its roof?*

How would this disposition of the kitchen depart-

'In the kitchen the grand essential is light. If light be abundant, if it pass into every part, there will almost certainly be cleanliness and purity in every part. If light be absent, if artificial light has to be employed to supplement sunlight, it matters not what care may be taken, the place will never be thoroughly clean.

'I have visited a house where the whole of the arrangements are on the most comprehensive scale; where money is no object; where the most skilful assistance is sought and obtained; where work is always in progress; where the strictest order and system are carried out. The best that can be done is done, but the best is a poor effort compared with what might be done; and all the difficulty lies in the bad lighting. There is no direct sunlight, for all is underground; and even when the gas is on in the full blaze there is a dark shadow somewhere. In such a place the refinements by which the art of cookery is made into a science as well as an art are out of the question. The best cook cannot see in gloom, and accidents are necessary evils, unavoidable and annoying. When there is accident there is delay, when there is delay there is loss of material; and when these two faults are enforced by a bad system there are constant vexation and unnecessary trouble. More than this, the attendants are not comfortable. They bear on their faces a settled gloom, which is but a reflex of the place in which they labour. In a dark kitchen there must of necessity be five enemies to the householder: there must be waste and uncleanliness, there must also be bad order, bad cooking, and it follows there must be bad health.'

ment affect household labour? will, I feel sure, be the question the reader will immediately ask. A little thought will, I think, supply the answer—that, contrary to what might be at first expected, the hygienic position is also a labour-saving one. It has been facetiously but truthfully pointed out, in regard to service, that the dishes, tureens, and such-like are heavier when upon their journey towards the dining-room than they are upon their return journey to the kitchen; therefore it is *dynamically wrong* to have the kitchen at a lower level than the dining-room. But, as I have elsewhere shown,* it is also a most unscientific proceeding to transport the human body with the material conveyed. In other words, it is very wasteful for a housemaid to be continually passing from kitchen to dining-room, carrying hither and thither every little article, no matter how trivial, which may be required —or, indeed, not required—whilst it cannot be gainsaid the carrying of heavy dishes, embellished with far heavier joints and other viands, is *heavy* work. All this is at once obviated by the employment of a simple service-lift, delivering all edibles and utensils directly and expeditiously to the serving hatchway, which should be found immediately beside the *buffet* or dinner-waggon. The same lift, if properly disposed, would also serve for the receipt of goods from the tradesmen. But in this relation I would strongly recommend, in the case of houses provided with only

* See p. 272.

one staircase, that this lift be supplemented by a light iron staircase, so disposed in relation to it that it should serve as a safe and efficient fire-escape. I present a plan—of a house of some pretensions, and provided with a 'service' staircase, in addition to the ordinary staircase—showing how this can conveniently be done *without* any *external* staircase.*

Before quitting the subject of kitchens it would be appropriate to say one word in regard to the mode of cooking carried on therein. It is that the last word of science in regard to cookery is—electricity. An electrically-cooked meal may be said to be perfection. With regard to *bouillon*, it, of course, matters little from what source the heat may have been derived, so long as it shall have been under perfect control; but in regard to *rôti*, electricity tells its tale in unmistakably perfect gastronomic language. Space will not allow me to enter with any detail into this interesting and important subject, a subject which Garden Cities—in which it is proposed full advantage will be taken of all apposite adaptations of applied science—are more likely to place within the reach of the inhabitants than anything at present *sur le tapis*. For this recent development in applied science awaits only one thing, and that one thing it is intended shall be available in the

* Small electro-motors have now become so cheap and efficient that with 'roof-kitchens' the work ordinarily entailed in the service as between kitchen and dining-room can now be economically delegated to electricity.

first Garden City—namely, *cheap electricity.* Why electro-cookery should be so perfect can be told in a few words. In every form of the operation of roasting or baking the outer surface of the joint or poultry is being incessantly and rapidly desiccated. To prevent it becoming dried up, recourse is had to frequent basting, a detail more carefully carried out by the French than by ourselves; for whereas we do this intermittently, they cause the operation to be performed continuously by means of a simple contrivance in the form of a miniature chain-pump, which supplies the roasting or baking entity with a continuous oleaginous shower-bath. But this drying of the surface is due, not so much to the heat as to the convection currents of air incessantly brushing past it, much in the same way as timber is expeditiously desiccated by a rapid fan-driven current of dry air. The disadvantage is found equally in gas-cooking, where the necessity for ventilating the oven also gives rise to this desiccating current. In electric cooking, on the other hand, there are no products of combustion to be got rid of; hence the deleterious draught of air can be abolished. The effect of this is that, whilst basting is rendered almost unnecessary, the surface of joint or poultry does not become dried up, remains perfectly soft, and can be 'browned to a T.' Moreover, this browning, albeit it is not necessary to revolve the joint, can be carried out to the greatest nicety; for instead of the heat emanating from a source at one side, it is made to impinge

upon the joint from *all four sides;* and if one side should be found more susceptible to its influence than another, it is only necessary to 'switch' off the current from that or either side.

Next in importance to a cheerful and healthy kitchen should rank the provision of a cool and efficiently-ventilated *larder.* Here again it might at first be felt that the lower regions of the domiciliary edifice might afford the best position. For a 'nice cool cellar' is a commodity asked for in houses, and not to be found in 'flats.' But, unfortunately, the sought after coolness is, in an underground position, almost invariably accompanied by damp and 'mustiness,' combined with stagnation. The *desiderata* in a perfect larder are coolness combined with dryness and freshness, and this can only be obtained by an above-ground position and plenty of fresh air. The conditions are to be found more perfectly complied with upon the roof than in the cellar; there, and there only, we have an abundance of fresh air. But, it may be urged, on the house-tops is also to be found sunshine, and sunshine means heat: how, then, can a cool larder be obtained up there? The answer is, By utilizing, in a scientific manner, the elements we there find, and bending them to our service, which for the purpose of producing a refrigerated storeroom is simple enough. For example, a larder—of size proportionate to that of the household—could be built in one with the kitchen, and of the same material: white glazed

brick inside and out, fitted with thick slate shelves and windows protected with metallic fly gauze on three of its sides, and a similar aperture in the door, so that the breeze might enter from all quarters. The door, of strong timber, would be made double, the enclosed space being packed with 'slag-wool.'* The ceiling of the larder would be formed of a single piece of thick slate, and this would be set with cement into the four walls, the latter being carried up about a foot above it, so as to form a tank. In summer-time the larder would have placed over it a thick, coarse blanket—after the fashion of a 'tea-cosy,' but for the opposite purpose, namely, to keep heat out instead of in—provided with cuts on the door side. The top of this rectangular 'cosy' would have two diagonal cuts made in it, extending from corner to corner, and the triangular-shaped lapels thus formed would, of course, drop down into the water contained in the tank. By the force of capillarity the portions of blanket lying in the water would keep the wool enwrapment always moist, with the desired effect that the hotter the sun the cooler would the larder become.†

* Slag-wool is a recently introduced product from the blast furnace, and is used alike for refrigerating chambers and for preventing the radiation of heat from steam boilers.

† The refrigerating effect thus produced is due to rapid evaporation, the powerful result of which is well known in the case of any spirit—as, for example, *eau de Cologne*—being placed upon the forehead and exposed to an air current, such as that produced by a fan. The physical fact is taken advantage of in

Having now trespassed, perhaps too long, in the demesne of the cook, though her trimly-kept and airy little garden is perforce most inviting, we will descend to the bedrooms. In leaving the flat roof, we by no means take leave of its beneficial effects, for, in order to economize the cubical capacity of our modern dwellings, it has become the practice to utilize much of the roof space in the upper bedrooms. I have referred to the extreme inappositeness of thin slates as a roof covering; not only are they prone to admit moisture, but they too readily conduct heat into the interior and abstract it from within our dwellings in a manner *precisely the reverse* of what they should do for the purposes of health and comfort. The result is that the bedrooms become excessively hot in summer and exceeding cold in winter. But this is not the worst, for, so rapid is the transference of heat through the thin slates, that the fall in nocturnal temperature also becomes excessive. Why this is physiologically so inimicable to health, especially of the elderly, is shown simply and clearly by the footnote.* The

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the transport of ice, which, as is well known, is wrapped in blankets and exposed to the sun.

* 'It is always a matter of great moment to maintain an equable temperature in the bedroom. A bedroom the air of which is subject to great and frequent and rapid changes of temperature is often a trap for danger. To persons who are in the prime of life, and who are in robust health, this danger is less pronounced; but to the young and the feeble it is a most serious danger. It is very dangerous for aged people to sleep in

scientific reason for the failure to obtain a more equable temperature is also simple. The thin slates —apart from the fact that their many crevices allow

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a room that is easily lowered in warmth. When the great waves of cold come on in these islands, in the winter season, our old people begin to drop off with a rapidity that is perfectly startling. We take up the list of deaths published in the *Times* during these seasons, and the most marked of facts is the number of deceased aged persons. It is like an epidemic of death by old age. The public mind accepts this record as indicative of a general change of external conditions, and of a mortality, therefore, that is necessary as a result of that change. I would not myself dispute that there is a line of truth and sound common-sense and common observation in this view; but when we descend from the general to the particular, we find that much of the mortality seen in such excess amongst the aged is induced by mistakes on the subject of warmth in the bedroom.

'The fatal event comes about in this way: the room in which the enfeebled person has been sitting before going to bed has been warmed properly up to summer heat, a light meal has been taken before retiring to rest, and then the bedroom is entered. The bedroom, perchance, has no fire in it, or, if a fire be lighted, provision is not made for keeping it alight for more than an hour or two. The result is that in the early part of the morning, from three to four o'clock, when the temperature of the air in all parts is lowest, the glow from the fire or stove which should warm the room has ceased, and the room is cold to an extreme degree. In country houses the water will often be found frozen in the hand-basins or ewers under these conditions.

'Meanwhile the sleeper lies unconscious of the great change which is taking place in the air around him. Slowly and surely, there is a decline of temperature to the extent, it may be, of 30° or 40° on the Fahrenheit scale; and though he may be fairly covered with bedclothes, he is receiving into his lungs this cold air, by which the circulation through the lungs is much

the air, which would otherwise act as an efficient screen, to escape—possess so poor a thermal capacity that they are unable to store up the heat of the sun by day, and, instead, allow it to stream into the house. Conversely they are unable to confine the heat thus passed in, and hence it rapidly streams out again during the night. Tiles are somewhat better, as they intercept the heat for a much longer time, but eventually become hot through, and then (in the height of summer) they present a two-fold disadvantage, for they—by their thinness—radiate their stored heat *into the house*, thus maintaining it at uncomfortably high temperature throughout the night.

With a thick concrete roof, on the other hand, we find the required conditions fulfilled. The length of a summer's day is insufficient to heat its mass through, and hence the bedrooms are kept cool.

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troubled. The condition of the body itself is at this very time unfavourable for meeting any emergency. In the period between midnight and six in the morning the animal vital processes are at their lowest ebb. It is in these hours that those who are enfeebled from any cause most frequently die. We physicians often consider these hours as critical, and forewarn anxious friends in respect to them. From time immemorial those who have been accustomed to wait and attend upon the sick have noted these hours most anxiously, so that they have been called by one of our old writers "the hours of fate." In this space of time the influence of life-giving sun has been longest withdrawn from man, and the hearts that are even the strongest beat then with subdued tone. Sleep is heaviest and death is nearest to us all in "the hours of fate." '—RICHARDSON.

Contrariwise, in winter, its great mass enduing it with a high thermal capacity combined with slow rate of conductivity and low speed of emissivity, the warmth of the bedroom is prevented from streaming out into space. There is, moreover, another strong point in favour of flat concrete roofs, one of the greatest importance in regard to the health of old persons—viz., their power of reverberation. The heat of the fire impinging upon solid walls and a solid ceiling* becomes stored up in them. As the fire dies down, however, and less heat is imparted to the solid walls, then they themselves become capable of imparting warmth; radiation from them commences, and the contained air is also enabled to obtain heat by contact with them. Hence a far more equable temperature is obtained throughout the night. I regret I am unable to give results from my own experience from houses constructed in this way, as, for example, those of Germany and the United States, but the following remark made by Dr. Richardson is of much interest:

'I lived for twenty-six years in a London house, possessing an asphalte roof, the first, I believe, of the kind ever erected in London, and I can say of it that it was simply perfect. It never let in water; it formed a surface which could have been turned into a garden or playground, and it caused the

* This does not apply to battened-out walls, a device resorted to with a view of preventing the moisture absorbed by the bricks showing upon the wall hangings, nor to lath-and-plaster ceilings.

temperature of the rooms down to the ground-floor itself to be more easily equalized than I have ever before known in any house I have visited.'

Of equal, or perhaps of even greater, importance with the maintenance of an even temperature is the problem of the efficient ventilation of our dwellings. Such a *vexata quæstio* is this, and so little real progress has there been made in its solution, especially in connection with our theatres, concert-halls, and places of public amusement generally, that it is a matter perhaps better not touched upon at all unless one has space and is prepared to go thoroughly into it. Unhappily, much the same has to be said in regard to our dwellings generally, our living-rooms and—which is still more important—our bedrooms. For where does one find a room capable of containing even a few persons which can be maintained at a comfortable temperature without periodically becoming 'stuffy' and necessitating 'freshening up'? where, moreover, one in which this 'freshening up' can be carried out without the simultaneous production of cold draughts? Although a more perfect system of ventilation has yet to be devised, science, in regard to the obliteration of the 'stuffiness,' has of recent years made a vast stride. Everyone knows that for the efficient purification of the blood, our lungs require an abundance of fresh air, but it is not so much a matter of popular knowledge that it is not the fresh air *per se* which effects the necessary oxygenation: it is to one ingredient only of fresh

air we are indebted for the revivifying effect and the preservation of good health—indeed, life—that one ingredient being the *oxygen.* The pensive and observant have viewed, now for many years, with both patriotic despondency and alarm the impaired —nay, dwindling—physique of the dwellers in our large towns. This is due to two principal causes—want of sunshine and want of oxygen. But the latter part of this statement requires qualification, seeing that it is not strictly true, for the true reason is by no means wholly attributable to deficiency of oxygen. It lies rather in the fact that town—and hence in more pronounced degree indoor—oxygen is not found to be in the *best condition* to carry out its vitalizing and life-sustaining and recuperative mission. We town-dwellers find ourselves 'so much benefited by a stay at the seaside' or upon the mountains, not because there is proportionately *more* oxygen there,* but because the oxygen there is *in a more active condition.* In such air careful analysis detects traces of ozone. But in reality there is no such thing as ozone. It is oxygen characterized by a peculiar molecular arrangement. The problem, therefore, we have to solve is, How can we set up this particular molecular condition in our towns and in our houses? With regard to towns, the problem is too Antxan to render discussion of it of practical value. We must look upon it

* At high altitudes there is, of course, *less* in a given volume of air.

as a case of the mountain refusing to go to Mahomet; hence the readiest solution is to take the towns into the country.

In relation to our dwellings, however, the desideratum has now—thanks to science—become not only perfectly practical, but capable of realization at nominal expense.* There is now no reason why every bedroom, every living-room, and every place of public assemblage should not be fitted with an apparatus, of size proportionate to its cubical dimensions, whereby the air could be 'freshened,' endued with the potency of sea air, and thus rendered capable of carrying on its work efficiently, in striking contrast with the defœdated and vitiated air one is constantly breathing within doors, and with the most valuable—nay, therapeutic—results in regard to health.

It is difficult to explain why oxygen should be made so potent in its action when thrown into this condition, as can now be done with such facility by slightly electrifying it; but is there a reader—

* Although it would be impracticable, from a financial point of view, to efficiently ozonize the air of our towns, yet I shall hope to see the day when the wards of our urban hospitals shall all be ozonized up to the standard of a seabreeze. The position of some of our hospitals in regard to electric mains conveying the requisite type of electricity is such that this good work could be carried out at a comparatively small outlay if any of our philanthropically minded were also minded to contribute the necessary sum. I have ventured to lay the idea before that great physician and scientist, Lord Lister, F.R.S., and have the pleasure of his endorsement.

especially a lady reader—but who can recall some process or operation in which 'freshness' is absolutely essential to success? Even the cookery-book impresses this fact upon us. Full well the careful housewife knows that, though the ingredients be exactly the same—and it follows their chemical composition identical—yet if 'freshness' be *non est*, the culinary operation will be a failure. The effect of 'freshness' in this regard has its counterpart in the '*nascent condition*' of the chemist. It is the imbibing of the oxygen in its 'nascent condition'—*i.e.*, at the *moment of its birth*—which produces the revivifying, fresh-life-giving effect. The surging billows are for ever *bringing into being* the desired commodity, and hence we seek, and obtain, health beside the ocean's margin. But we can *imitate* this action in *our homes*, if we will, and bring within them—health.

The 'freshening' of the air must, of course, not be confounded with the replacement of vitiated (deoxygenated) air by *new* air. To keep a room fresh and healthy two things have to be done *concurrently and continuously:* (*a*) the removal of vitiated air, and (*b*) the admission of fresh air to take its place; for after use the life-giving oxygen will be found combined with carbon—effluent from our lungs—in the form of carbonic acid, a poisonous gas.*† This it is

* For relative volumes of carbonic dioxide produced from various illuminants, etc., see Chapters V. and IX.

† There are, of course, two methods of removing the non-life-

necessary to remove from the interior of our dwellings; it is necessary, moreover, to remove it continuously and expeditiously, the difficulty being how to effect such removal without producing draughts. Apart from health, a very small percentage of CO_2 in the air of living-rooms seriously detracts from our comfort; it induces drowsiness, and leads to serious waste of time and the exhibition of ill-temper. We think we are 'sleepy' and need sleep when, in fact, we do not require it. There is probably nothing more wasteful in the office than a trace of this

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supporting and poisonous products of respiration and combustion: (*a*) the bodily removal of the air containing them, and (*b*) the extraction of them *from* the air. There are conditions under which each system has its advantages. In dwellings the removal of the air *en masse* is best and most convenient, whilst in regard to hospitals, crowded buildings, and subterranean railways, the second method is the more scientific. I am not aware of any practical application of the latter method, but very little reflection will serve to show that its adoption will shortly become a matter of absolute necessity, having regard to the very rapid extension of our underground communications now being carried into effect. The enormous outlay in huge fans and air-propellers recently installed has proved of little avail, and a more scientific treatment of the problem is demanded. I would recommend in regard to our 'twopenny tubes' the adoption of a cascade of water saturated with lime—whitewash it would virtually become—at each station; whilst in regard to hospitals a miniature replica of them in the form of a film of lime-water circulated and descending a glazed-brick wall or a metallic column would have the effect of decarbonizing the ward.

By careful calculation I find the quantity of lime requisite for this latter purpose would be but small.

poison. The merchant who thinks he is saving money in rent by setting his clerks to work in basement offices may in so doing be incurring an expenditure far more than outweighing it. In Garden Cities, it follows, work—especially clerical work—should be carried out both expeditiously, economically, and healthfully.

The problem is one demanding far more consideration upon the part of architects and others than it has hitherto had; but it is by no means rendered the more difficult by the installation of ozonizers, for the purpose of enriching the contained air. It has of late years become the practice, in regard to wealthy patients, when the end is drawing near—*in tempore extremo*—to prolong life by administering oxygen, and by the dissemination of this life-supporter into the air of the chamber. Oxygen is expensive and difficult of management, but to revivify atmospheric oxygen is simple and cheap. Why, therefore, I would ask, should not the beneficent results thus obtainable be taken advantage of during life, and for the purpose of obtaining and prolonging health in our great and overcrowded towns? Why, I would ask, should not its aid be invoked at all periods, especially during sleep, when respiration is at its lowest and recuperation at its slowest, for the maintenance and improvement of health, seeing that the attainment is now within the reach of almost all town-dwellers? Not alone in the bedroom should the ozonizer be found, but also in the

nursery. An eminent physician, blest with a number of children, has just told me by this means he has been enabled to effect a remarkable improvement in the health of two of his weakly ones, with the added advantage that he is saved the expense of frequently sending them and their nurses to the seaside. Without question this matter is one demanding far greater consideration than it has hitherto received, and this must be my apology for having brought it forward in these pages.

With regard to ventilation—consisting in the *primâ facie simple*, but practicably realizable *difficult*—operation of removing the *used* air and admitting *fresh*, I will say but one word, and that for the purpose of drawing attention to a fallacy which lies at the very root of the want of success. You *cannot* get rid of the one without *simultaneously introducing* the other, yet in ninety-nine cases out of a hundred, whilst strenuous efforts are made to attain the first (by the provision of suitable outlet), the other is entirely forgotten, and no provision whatever is made in its regard. Perhaps words could be greatly economized, in favour of the general reader, if this were explained by means of a diagram.

Considering that a *third part of our lives* is—or ought to be—spent in sleep, great care should be taken that hygienic considerations reign supreme in regard to our bedrooms. With regard to their construction, they should be thoroughly lighted, sunshine should be invited and encouraged to enter, *not*

excluded, and they should be roomy—at least 1,200 cubic feet of space being allowed for each sleeper. But their cubical capacity should not be reduced by packing them full of unnecessary—especially absorbent—furniture. Nor should that insanitary and unnecessary luxury a *fixed* carpet be allowed. In this relation it is pleasant to observe the present somewhat severe style of bedroom furnishing coming into vogue. But, moreover, a bedroom should be used as a bedroom—a sleeping-room. Not as a dressing-room, an ante-chamber in which it is necessary that all clothing, boots and shoes, especially old clothing and offensive articles of the same order, should be left.* Modern dwellings for the well-to-do should certainly have a *dressing-room to every bedroom*, and these should in many cases be bath-dressing-rooms, and in all cases lavatory-dressing-rooms. The 'wash-hand stand' should figure only in antique museums, a view every chambermaid will with alacrity endorse. Surely in these troublous times in regard to domestics, the day is past for the continuance of *utterly useless labour* in the household, and the heavy work of carrying water, both hot and cold, to bedrooms and

* That most insanitary receptacle—the soiled linen basket—should not find place in any room. Its whilom contents should be delegated, not to an open basket-work receptacle, which is tantamount to leaving them in the open, but they should be placed in an enamelled iron bin; there could be nothing better than an ordinary cornbin kept in the chambermaid's department.

removing it again after use is to-day quite avoidable, and should be placed in the same category with the carrying of coals and ashes and the blackleading of stoves—namely, that of the useless and unnecessary. The provision of lavatories, fitted hot and cold, would annihilate this useless labour, and in large establishments the amount of interest of money and upkeep should be far more than outbalanced by diminished cost of labour.

And surely the 'hip-bath' should go the way of the 'wash-hand stand'; hence the suggestion of bath-dressing-rooms. But in every well-ordered establishment these should be supplemented with a well-equipped bathing-room, and this room—modern medical science most unmistakably points out—should be so arranged as to serve as a Roman bath as well as a douching-room. In these pages I have had occasion repeatedly to refer to and to quote from that great hygienist Richardson, and had I not done so, I should have been gravely wanting in the performance of my duty. Such is rendered necessary, not only by the importance of his utterances, outcome of an active, learned, and far-seeing brain, but by reason of the fact that he devoted a life of incessant labour and quite exceptional activity as a benefactor to mankind of the world at large, whilst his transparent sincerity and charming frankness of character render the making of such references on my part, having enjoyed the advantage of his acquaintance, a great pleasure to me. In nothing I

can recall do these characteristics come out more forcibly than in regard to the matter we are now considering. For upon the introduction of the Roman bath (now more generally, but less appropriately, called the Turkish bath) into our country, some forty years ago, because his remarkable prescience led him to see that its use would have such a beneficial effect upon public health that he feared physical exercise and the value of outdoor life might become looked upon too lightly, and hence its influence be prejudicial in regard to public health, he deprecated its use. I cannot, I am sure, do better than use the learned physician's own words: 'In speaking in favour of the Roman bath, I am, I know, offering some slight correction of what I spoke on the subject five-and-twenty years ago, when the hot-air bath was being enthusiastically introduced into this country by a few of its over-earnest advocates. To me it seemed at that time as if the advocates of the bath were claiming it as a panacea for all maladies, and were fain to declare that to its efficacy *outdoor air and bodily exercise might well be sacrificed, and a slothful luxury take the place of a hardy, healthful existence.* It is but just to state that certain of these advocates did go even to this length, and that I and others thereupon went perhaps too far the other way in our criticism of them, and so checked a useful measure while it was new, and before it had taken root.'

And then follows a passage eminently characteristic of the trait to which I have ventured to refer, for he continues: 'If I did wrong in that way, I recall it now. Holding as firmly as ever the view that the hot-air bath should never take the place of healthy exercise of body, nor of active outdoor life in good and wholesome air, I am satisfied, from a larger and longer experience, that the Roman bath is an addition to the English house which should never be ignored when circumstances admit of its introduction. Last winter (1885), in the treatment of a number of persons who were under my medical care, *I would have given anything* for the advantage of being able to remove them, *under their own roofs*, into a well-constructed hot-air bath.'

In the last phrase I have italicized is contained the reason why, albeit this type of *public bath* has made much headway of recent years,* the extension has not been far greater. It is because they are not to be found beneath the roofs of our dwellings that they are not more resorted to, for in these high-pressure times busy men cannot find the time to visit them during the daytime, and they prefer to sacrifice their 'Turkish' rather than their home comforts in the evening—this apart from many inconveniences inherent to the taking of the bath away from one's home. It is but a few years since; in order to obtain anything but the ordinary warm

* In London alone there are now some five-and-twenty Turkish baths, and about double that number in the provinces.

bath, one would have been compelled to go abroad. Even to-day, I know of no such perfectly equipped Turkish, Roman, and Russian baths as one enjoys at Baden-Baden. Happily things are rapidly changing for the better, and we now have therapeutic thermal baths and electrical treatment available within our own shores; the pioneer in this relation being, perhaps, the Corporation of Harrogate. It is to be hoped and expected, however, that the 'First Garden City' will shortly be coming in a 'good second' in this regard. The value of this modern revival of an ancient form of ablution *in the household* is thus referred to by the same physician:

'In this cold and damp and variable climate, the Roman bath in the house is of more importance than it would be in warmer and more equable climes, for here it is less of a luxury and more of a necessity. If, in our heavily fogged London atmosphere, the tired Londoner, after a day of oppression, could return home, and for an hour before dinner indulge in the light and genial and clarified air of a Roman bath, he would do more to relieve his congested and enfeebled internal organs than by any other process that is obtainable. As it is, he is led too often to seek a false and partial relief from his oppression by resorting to some stimulating drink, which first elates, and, by too frequent repetition, paralyzes, injures, and kills him outright. In a word, he smothers his afflictions, while in the Roman bath he would disperse them and drive them away.'

To-day science has provided us with the ready means of obtaining Roman baths in our homes, of which Richardson could, with all his prevision, hardly have dreamed. He took the greatest of pains to show how, by means of the 'Calorigen,' ordinary household bathrooms could be converted into hot-air baths, going so far as, in cases of grave sickness, to see to their installation beneath the sufferers' own roof, in order that his patients might be removed from their bedrooms directly into them. But science has gone farther: it has shown us how we may reap all the benefits of the 'hot-air' bath without any hot air. The invention of the thick filament incandescent electric lamp now affords the means of obtaining the most enjoyable and health-giving (perspiratory) *light* bath yet attained, and, for the present at least, has said the last word in regard to electro-hydropathy. Yet it is so simple that it can be introduced into our dwellings at small cost.

The design of the bath-room of the modern house should, therefore, be such as to admit of the 'dry' bath being taken in conjunction with the ordinary tepid and cold water bath and the tepid and cold douche, in which cases all the processes involved in the Roman, Turkish, electric, and light baths could be carried out in one's own bathroom.

If one asks if the present mode of construction of the household bathroom is suitable, one cannot but reply that it *might* be better adapted, but it would also be true to add that it might be modified so as

to be *far* better adapted to even its present use. Just as hygiene and common-sense have banished fixed carpets and replaced them by movable squares, capable of being conveniently removed at all times, the margins cleansed and the harbouring of germ-laden dust prevented, so are they gradually banishing the enclosed bath, and replacing it with those of Roman type furnished with feet, by which it is supported a short distance above the floor. I cannot, however, but feel they will also shortly banish the upstanding bath itself, and, that done, then the road is clear for the enjoyment of the other forms of bathing without any additional expense.

If we stop to reflect, we shall see that the present form of bath is wrong from every point of view. In the first place, the material of which it is made is wrong. We take a rapidly oxidizable material (iron), and strive to cover up its imperfections with an earthy glaze, when we should have taken the earth itself and glazed it. There is nothing so hygienically perfect as glazed stoneware for a bath, nothing so durable, so easily cleansed, and costing so little in repair. Then, the shape and position of the bath are wrong. It is difficult to get in, and more difficult to get out, especially for aged people. Physicians continually impress upon us the inadvisability of 'total' immersion. To admit of total immersion and to prevent the water splashing over on to the floor, the bath is made unnecessarily deep. Physicians, moreover, earnestly impress upon us the

danger of rapidly rising from the prone to the erect position, *especially* when the heart* is enfeebled from taking a warm bath with total immersion; yet the high sides of the ordinary bath—especially those provided with a slippery wood 'surrounding,' whereon usually nothing is provided to lay hold of—call for an extreme degree of exertion. The position is wrong, because the bath is placed close to the wall, rendering it difficult to clean under the one side, with the further disadvantage that one scrubs one's self to the accompaniment of a vigorous tattooing of one's elbow against the wall, unless one goes to work 'crab fashion.' Were it placed in the middle of the floor, it would obviously be very wasteful of space.

The more practical construction of a bathroom would surely be the following: The walls should be of glazed brick or tile. A 'peacock'-blue dado in this material, with 'French gray' upper walls, makes an inviting bathroom. The ceiling should be of 'Emdeca'; the floor of unglazed tiles, furnished with miniature flutes to prevent slipperiness, the direction of the flutes being towards the centre of the room. The bath, with an almost flat bottom, slightly curved where it meets the sides, should be little more than a foot in depth,† and should be

* Most interesting calculations of the horse-power the heart is called upon for in this operation, so dangerous to the feeble, have also often been given.

† Baths are usually 18 inches or 19 inches deep, but 13 inches or 14 inches depth of water will cover a stout person when lying

sunk into the tiled floor, its edge being about a quarter of an inch below floor level, and provided with a light chequered aluminium lid, pierced with a number of holes. A three-splay-legged* stool of pitch pine, with a circular seat, about a foot high, should be provided for use in the bath. The douche should depend but a short distance from the centre of the ceiling, and at a point near one end of the bath, in order that the stopcocks (hot and cold) may be held in the hands whilst taking the douche. These cocks should be flush with a short brass rail, placed at convenient height, to act as handrail in getting into and out of the bath. The bath-room need not be larger than it is now often found, and no provision in the way of curtains, etc., need be made, as the water splashed upon the walls during douching would be promptly returned to the bath by the flutes in the sloping tiled floor. The end of the bathroom nearest the doors leading into the bedroom and on to the landing should be partitioned off by a glass screen, and inside this screen should be ranged on three sides the thick filament electric

down, the extra depth being provided as a precaution against slopping.

* A support provided with four legs is an unscientific form of construction, seeing that to secure rigidity it is absolutely necessary that it be placed upon a perfectly *flat* floor. A tripodic mode of support is productive of perfect rigidity, no matter how uneven or slippery the ground may be; hence all scientific instruments, such as levels, theodolites, telescopes, and the like, are invariably mounted upon three legs.

lamps for the light (perspiratory) bath. All, then, the jaded citizen would have to do would be to throw a sheet around him, take his seat behind the screen, read his newspaper until he thought he had sufficiently exercised his skin, and then, switching off the current and passing into the bathroom proper, enjoy his hot-toning-to-cold douche; then, slipping on a Turkish towelling gown, he would disappear into his bedroom for his *siesta* preparatory to dressing for dinner.

Having now descended from the kitchen to the bedroom floor, we should, in the ordinary mode of house design and construction, now find ourselves upon 'the landing'; but here we must pause to consider if 'the landing' be a necessary and desirable thing—indeed, if it be permissible in a house built upon principles of hygiene. It has been characterized as 'a terrible trouble to the sanitary mind.' That has arisen principally from the fact of its being usually deficient in light, and having adjacent to it the receptacle — 'necessary but fearful'—of the housemaid's cupboard or closet, and, it so often happens, a water-closet. When one has walked through a number of houses, one cannot fail to bring away the impression that the landing is a very wasteful thing. It often covers a considerable area, in this being governed by the size of the hall, the proportion of which has of late years been greatly augmented. It is frequently furnished with comfortable settees, upon which no

one ever sits, unless it be one of the more daring couples at a dance.

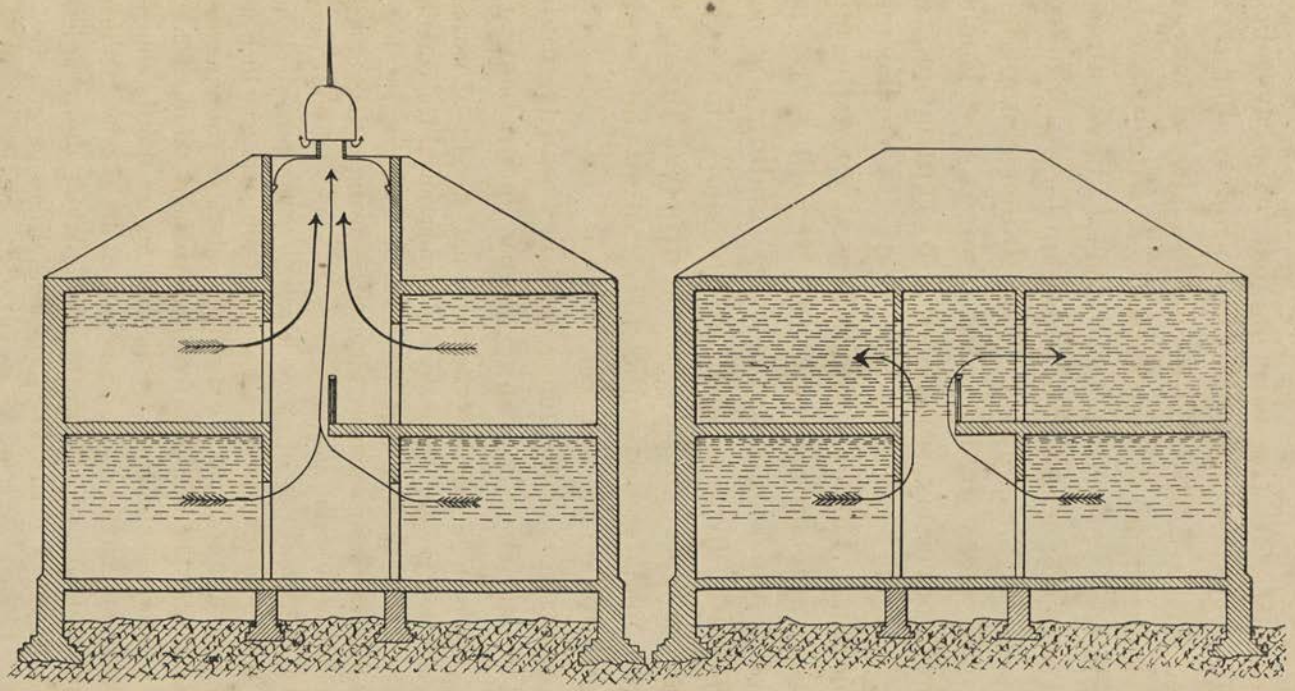
To the eye of the engineer, however, these are small things in comparison with the palpably insanitary effect the landing must needs produce upon the building. To his eye the staircase is an 'upcast' or 'ascending ventilating shaft'; but whither are the deleterious gases led by it? The reply is ominous, for it can be none other than '*to the bedrooms.*' Nothing could be more prejudicial to the health of the household, especially in dwellings lighted by gas. The effect of this ascending ventilating shaft is to ventilate the reception-rooms and to defœdate the bedrooms. Put into other words, the air we have used and defiled during the day is conveyed by the staircase to the landing, and there arrested by the ceiling and fed into the bedrooms, to be again drawn into our lungs during the night-time. It requires not science to tell us this: the nose proves sufficient of an analyst if we peer over the banister-rail of this wasteful portion of the house anatomy.

If we would make a practical test of the alarming extent to which the upper stratum of the air of dwelling-houses becomes vitiated, we have only, after a long winter evening, to mount a pair of steps and ascend close to the ceiling of a living-room. There we find it almost irrespirable, the high temperature, the lack of oxygen, and the nauseating degree of vitiation being sufficient to make even a strong man

feel faint.* In the carrying out of a system of domiciliary ventilation this powerful tendency for heated, vitiated air to ascend must always be carefully kept in mind, in combination with the other fundamental principle to which I have already adverted—the necessity of provision for *simultaneous* admission with *expulsion*. Two things cannot be in the same place at the same time is the Euclidic axiom; conversely, in regard to ventilation, one thing cannot be removed without its replacement by another. This may be impressed upon the mind of the non-technical reader by recalling the procedure of the sage jackdaw, who, finding his beak insufficiently long to get at the milk in a jug, straightway brought stones and dropped them into the jug until he had sufficiently raised the level of the milk to be able to drink it.

The action taking place will be readily understood from the diagram. Many have been the

* It has been urged that the molecular weight of carbonic acid gas being greater than air, the former should accumulate upon the floor, weight being added to such reasoning by the fact that loss of life has frequently taken place owing to its collection at the bottom of wells, and to the fact that one can pour the gas from vessel to vessel as one would water. Such an effect, however, could only take place in a chamber all parts of which were at an equal temperature. In dwelling-houses, in consequence of the nearness of the walls, the bodily movement taking place in them, and for other reasons, the air is being constantly churned, principally by convection currents, which lift the heavier gases upwards and circulate the intrinsically lighter downwards, so that the degree of vitiation becomes more or less general.



Comparative Diagram showing the Deleterious Effect upon Ventilation of the 'Landing,' and the Beneficial Effect of placing the Staircase Ceiling at the Level of the Roof.

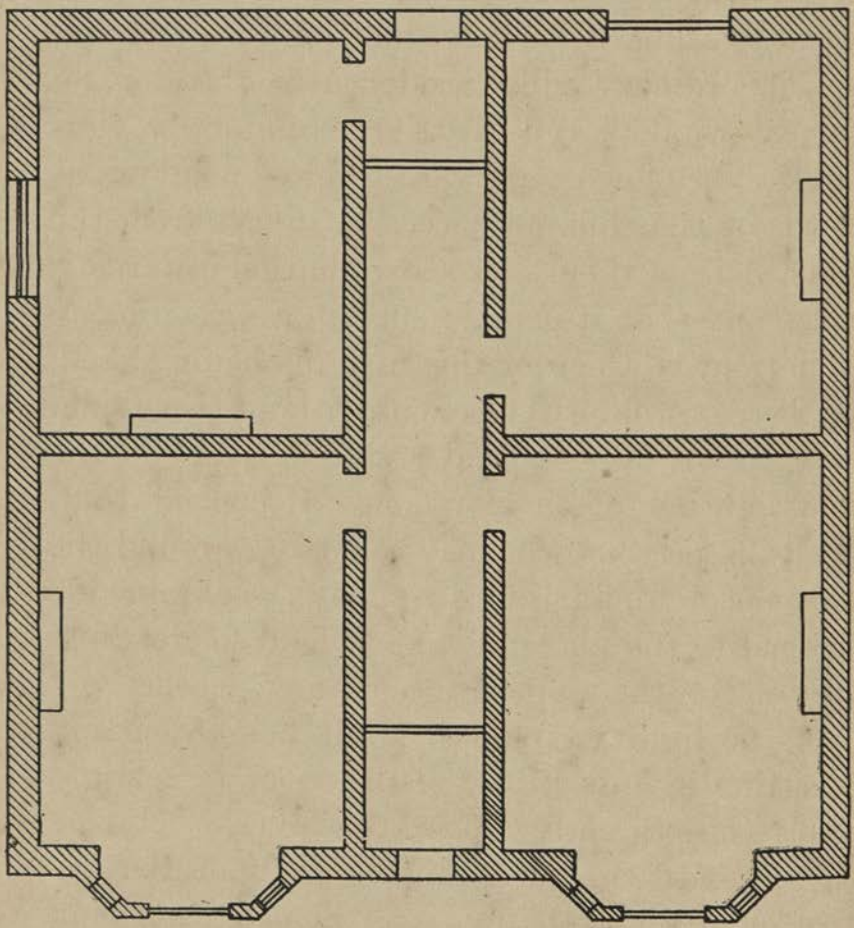
remedies propounded, one of the best being the building of a shaft connecting the landing ceiling with the roof, and the induction into such shaft of the vitiated gases by means of a gas-burner kept always alight within it. This is a poor enough and but partially effective compromise. A far more efficient and beneficial, and at the same time practical, solution is obtained by abolishing both the 'landing' and its ceiling. In doing this, moreover, we combine a measure of health with a most important structural improvement, for the nobility of the interior of the dwelling is surprisingly enhanced. The 'square hall,' now so much asked for, has only to be carried up to the roof and the 'trouble' not only disappears, but another fine reception-room is added to the house—the most healthy of them all. The 'landing' being metamorphosed into an imposing balcony, the hall becomes both the most imposing and the most artistic room in the house. The sectional diagram of a house thus modified will serve to show how very perfect the ventilation of a dwelling built with a 'full-height' central hall becomes. This, together with the staircase, now *veritably* becomes an ascending ventilating shaft, ventilating upon the true scientific principle of '*from* the *exterior to* the *exterior*,' sometimes referred to as '*washing through*.'

As we descend to the ground-floor level, we appreciate that the 'roof-kitchen' possesses more than hygienic value, for we find its space more

congenial and more valuable than its company. We appreciate that the *whole ground-floor* area is available for living rooms; and if we look upon—as we certainly should—the central hall (which for brevity we may style 'the *lounge*') as a reception-room, we shall see that this design of house enables us, if we will, to dispense with one 'living'-room; or, seeing that 'the lounge' would be the 'most used' room of the house—who, for example, would elect to sing in a drawing-room in preference to such a lofty apartment as the lounge, and who would not prefer a 'grand' piano to a cottage if 'only one had somewhere to put it?'—it is clear there would be no need for a large withdrawing-room—so clumsily and inappropriately corrupted into 'drawing-room,'—or *salon*, as it would be better styled.

Instead, however, of curtailing the superficial or ground area of the dwelling, I have, in the explanatory plan, subdivided the two lateral areas so as to produce a library or study, on the one hand, and a boudoir or winter drawing-room upon the other, thus making *five* reception-rooms. Another valuable result of the exorcism of the ground-floor kitchen, it will be observed, is that windows lighting the living-rooms upon *all* sides of the house are obtainable.

Engineering has no significance in regard to the reception-rooms, seeing that what applies to other rooms in regard to artificial ventilation, heating and



Plan showing the Disadvantageous Position of Fireplaces usually to be found in Villa Residences.

lighting, is equally applicable in regard to these. I will, therefore, limit myself to a single remark, and this anent the serious disadvantage the prevalent fashion of placing the chimneys—it follows the fireplaces—against the exterior walls presents in regard to natural lighting. The diagram shows the ground-plan of an ordinary villa residence of the double-fronted bay-window type with the chimneys thus arranged. Very few people care to have windows at either side of the chimney-piece, for, apart from the draught felt from them, the cold radiation inwards is so unpleasant that it usually ends in a screen being placed in front of them or the curtains being closed. I have, therefore, shown the rooms without these side-windows. Now let us consider the efficiency of the daylight lighting of these rooms. It is clear that, out of all the persons who may be sitting around the fire, only *one* obtains light as it should be obtained—viz., normal to the plane of a book held for reading. The person in the opposite 'chimney' corner not only gets no light to read by, but has to submit, whilst sitting in a dark part of the room, to a bright light playing directly upon the eyes. Having myself witnessed the deleterious effect upon the eyesight of elderly persons living in houses thus built—of which there are so many thousands—I cannot too strongly condemn the design, and add that it should be laid down as an axiom—for many more reasons than the one touched upon—(*a*) that chimneys should not be placed against external

walls, and (*b*) in all cases the windows should be situated *opposite* to the fireplaces.

Within the dwelling there cannot be too much light, but the efficiency of internal *natural* lighting —as is the case with *artificial* lighting—is dependent not only upon its intensity, but upon the *uniformity of its diffusion.* It is in regard to the latter point the skill of the architect is principally evinced. As to the intensity, this is influenced primarily by the area of window provided in proportion to the cubic capacity of the rooms. Statesmen, like all other mortals, are prone to make mistakes. No greater mistake was ever made than the imposition of the window-tax—the taxation of the light of heaven. But the degree of efficiency of natural household lighting is dependent upon another thing—the *style of architecture* in which the dwelling is built. Let me therefore impress, with all the force I possess, the propriety—nay! absolute necessity, from the point of view of health—of choosing, in connection with Garden Cities, *only that style* of architecture which *will* lend itself to the provision of *ample window area.*

Having now glanced into all the rooms, we have only to notice in passing out of our subject the vestibule (vestibulum). This is a portion of the well-to-do man's dwelling, rarely receiving the consideration its importance merits.

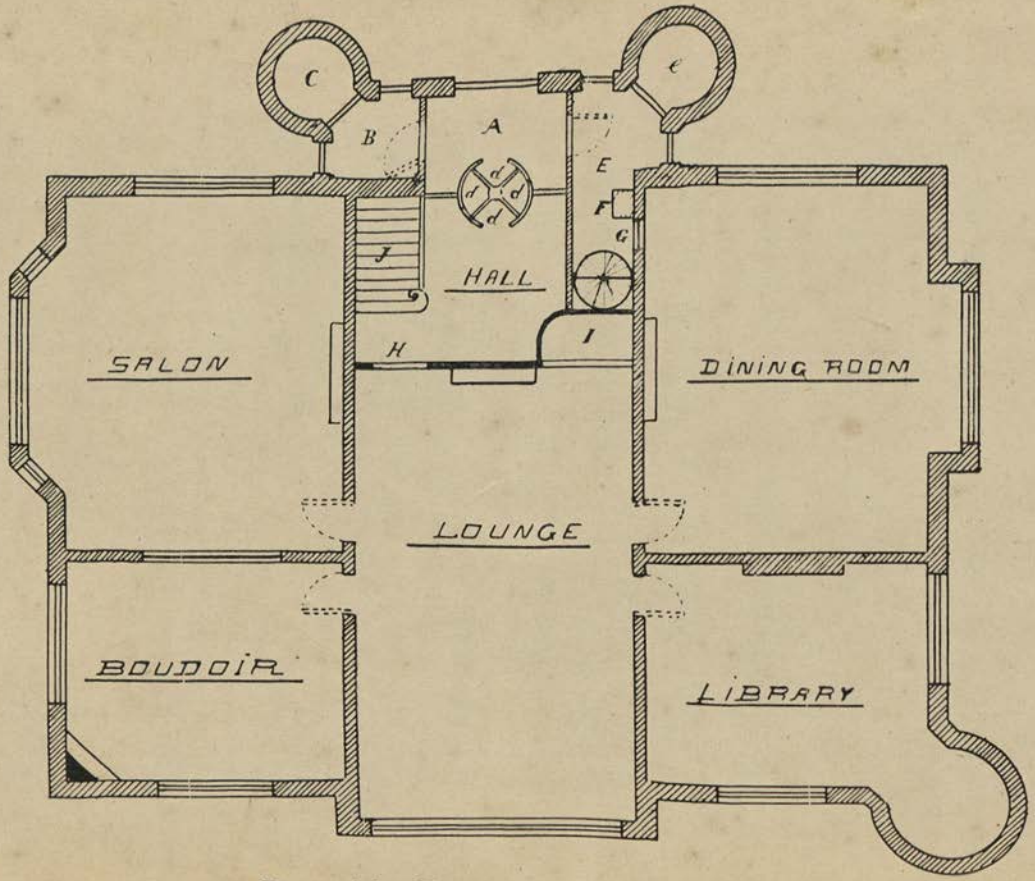
A vestibule, or outer hall, is in reality an essentially utilitarian portion of the house, and

should be capable of performing several important functions bearing largely upon the comfort of the household. Among these may be mentioned (*a*) the prevention of cold draughts entering the house upon the main or 'front' door being opened. This is usually effected by furnishing it with double doors. The efficiency of these, however, lies more in theory than in practice, for in practice it is usual to open both doors at the same time, whereby the intention is entirely defeated. An ingenious device which really does fulfil the requirements is now making its appearance in our country, introduced, I believe, from America—I refer to the 'revolving' doorway. The vestibule should also (*b*) provide enclosed lobby accommodation for outdoor clothing, yet we often find the halls of even superior houses disfigured by an unsightly array of hats and coats. Again, and this is most important, the vestibule should provide a lavatory and a *screened* means of access to family conveniences, and this in such a manner that exhalations therefrom cannot enter the dwelling. The practice of building w.c.'s *within* the walls of the house, and often *not* against the outer wall, cannot be too severely condemned; one often finds, indeed, in mitigation of the shortcomings due to this faulty disposition, ventilating devices, such as a pipe leading to the roof with a gas-jet in it, fan apertures which are *supposed* to revolve, etc., all of which are quite unnecessary if such conveniences be placed outside the walls, and they be furnished with windows of

large area instead of the grotesquely small and exteriorly disfiguring holes for windows so frequently to be seen, especially in the 'Mary Ann backs.'

In the sketch plan I have shown a vestibule with a revolving door and two pairs of ordinary doors; either the one or the other could be carried out. Neither is, however, really requisite with the vestibule screen arrangement shown, for both the lounge and the gallery are shut off from the staircase by doors. There is an enclosed lobby, and the lavatory, w.c., etc., are outside the main wall of the building, as is also the bathroom on the bedroom floor. The staircase also is outside the main walls of the house, by which disposition internal space is economized, the 'flatness' of the exterior walls—so characteristically disfiguring in the architecture of three-quarters of a century past—is relieved, and the hot ascending (defœdated) gases, instead of being *led to* the bedrooms, are *extracted from* them, and caused to pass out of the building by a ventilator forming part of the cupola surmounting the 'grand' staircase, and another, acting similarly, surmounting the 'service' staircase.* The last-mentioned stair-

* It will be observed that the lift is in one with the service staircase, also that it descends *immediately outside* the 'service' door of the dining-room. The object of the arrangement is that conversation during dinner should not be interrupted by noise from its working, and yet the *minimum* distance for carrying the dishes be preserved. The service staircase would be shut off by a partition from the parlourmaid's room; the object of this is that all draught into the dining-room during service would be



Proposal for Plan of the Best-class Houses.

DESCRIPTION OF PLAN OF HOUSE HAVING ROOF-KITCHEN AND ROOF-GARDEN.

Ground-floor Plan.

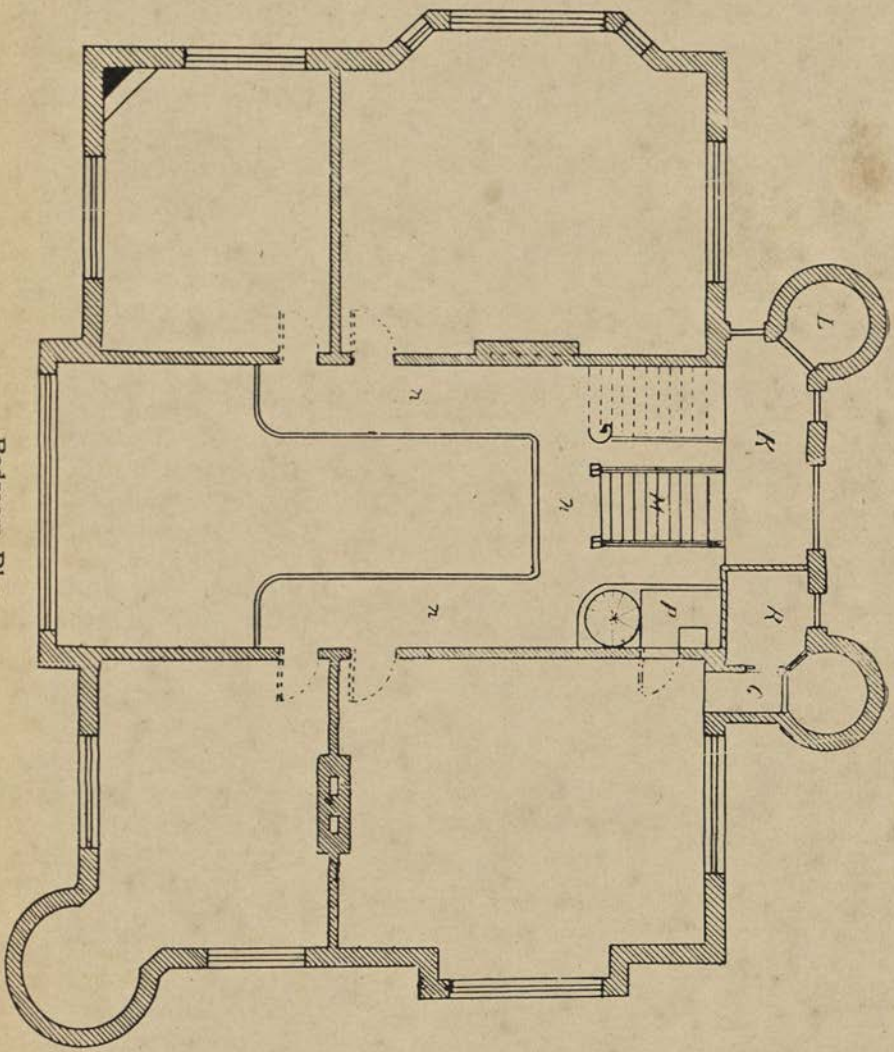
A. Entrance lobby.
B. Men's hat and coat lobby.
C. Men's lavatory, etc., in tower.
d, d, d, d. Revolving doorway.
E. Service lobby with stillroom (e) in the tower and door to entrance lobby.
F. Service lift, descending from kitchen, with hatchway into dining-room.
G. Service door to dining-room.
H. Arched doorway in oak screen between hall and lounge.
I. Recess for organ.
J. Main staircase leading to half-landing, with arboretum in the tower.

The dining-room (25 feet by 20 feet) has one flat window and one recessed. The library (20 feet by 18 feet) has two flat windows and a window reading recess in the tower. The lounge (32 feet by 20 feet) extends from the ground floor up to the roof, and has a chimneypiece the whole height to the gallery screen at one end, and a mullioned recessed window the whole height to the roof at the other end. The boudoir (20 feet by 16 feet) has two mullioned windows and an inglenook fireplace. The salon (25 feet by 20 feet) has a large oriel window and a flat one.

Description of First-floor Plan.

K. Half-landing.
L. Arboretum.
M. Continuation of main staircase leading to gallery.
n, n. n. Galleries.
P. Service landing.
Q. Doorways and bridge leading from bedroom to bathroom —w.c. in tower.
R. Bathroom.

The service-lift and staircase continue up to the roof. The arrangement of kitchen, etc., upon the roof will be seen in the bird's-eye view of grand promenade (p. 200 B). In cases where the billiard-room is on the roof the staircase (M) also continues up to the roof. The size and shape of the bedrooms are precisely as the reception-rooms.



Bedroom Plan.

case, which would be built *absolutely fireproof*, continues up to the culinary department, whilst the 'grand' staircase would only be continued up beyond the bedroom floor in the case of the billiard-room being upon the roof, an excellent position for it for many reasons. The table could there be lighted by a skylight, the position being a very healthy one, whilst in cases where ladies object to smoking, the smell of tobacco would be prevented from entering the house. A more sociable—at the same time more economical—arrangement would be to place the billiard-table in the lounge, where it would also be lighted by the skylight.

Having referred to the material of the exterior face of the walls, it might be added that in regard to interior walls great changes have taken place, during the last score of years, as to the mode of treating them. A number of new types of 'wall

excluded; but after meals this door would be opened, as would also a corresponding door upon the roof in fine weather, and then, as it will be seen, on opening a window in the dining-room a rush of fresh air inwards and across the dining-room to the 'upcast' shaft, and thence to the roof, would take place. In bad weather the ventilator in the cupola above the service staircase would effect the elimination of all trace of 'meals.' The 'tradesmen's' door is situated immediately beside the rear aperture to the lift, so that goods may be delivered directly into it for transport to the cook. The 'parlourmaid's' room, as I term it, seeing the trend of things, in preference to 'butler's pantry,' would of course be fitted with water for washing china, which, together with the cleaning of silver and certain of the 'still-room' work, would be carried out here.

coverings' have been invented, *all* of which are far more satisfactory from the point of view of compliance with hygienic requirements than was the almost only covering to be obtained before that date. The old-fashioned papers, especially those of the 'flock' type, were *most* insanitary, and although wall-papering is a ready, cheap and effective method of wall-treatment, certainly nothing but 'sanitary' wall-papers—*i.e.*, those which can be cleansed by means of a wet cloth—should be made use of. So much has already been written—and justifiably written—as to the danger to the health of the household from 'layers of mouldy paste and size, layers of poisonous* paper, and layers of absorbing coloured stuff or distemper,' that I will not touch upon them beyond reiterating the admonition—now that we *have* more sanitary substitutes—to discard them.

In all positions where the preparation of food or its storage is concerned, as also in regard to bath-

* All of refined taste must have noticed—with the greatest satisfaction—the vast improvement that has taken place, during the last ten or twenty years, through the transition from gaudy to subdued colouring. This is particularly noticeable upon the stage, especially in regard to the ballet, the hideously vivid colours of the sparse costumes having now for some time given place to the exquisitely subdued colouring of flowing draperies. The same is noticeable in regard to wall-papers; there being less demand for vivid colouring, especially green, the deleterious effects of coloured papers have greatly diminished, though not before they had claimed many victims, brought to their end after long and painful illness due to the arsenical pigments.

Mural Decoration in Glazed Tiles (Doulton).

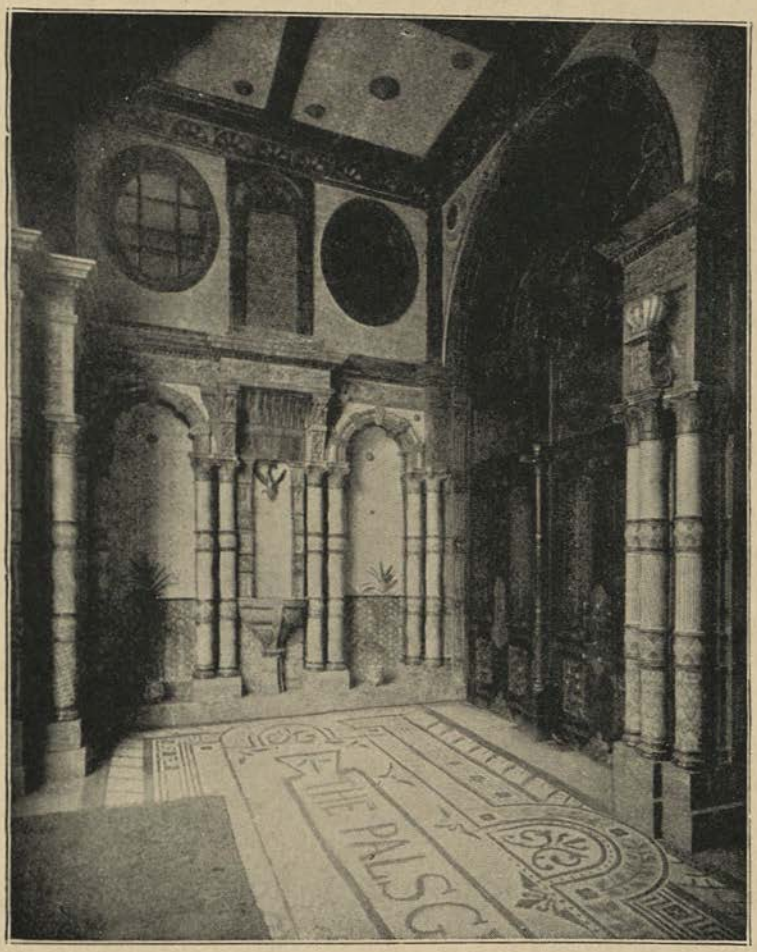
rooms, lavatories, w.c.'s, culinary service passages, and such-like, there can be no question that in hygienic value there exists nothing so perfect as tile-work. Happily, also, there is nothing the introduction of which is at present making such satisfactory strides. Confining myself to the preparation of food, it may be interesting to mention that one of our largest firms of caterers, Slater's, Ltd., confine themselves almost exclusively to this material, the predominating colour being white. In the kitchens, still-rooms, etc., the whole is tile-work, with the exception of the ceiling, which, instead of being 'whitewashed,' is painted in order that it may be cleansed with soap and water. A gratifying point in regard to ceramic work is that, although it may be of the plainest, simplest, and, if desired, colourless, yet the potter is now able to fulfil the most elaborate and artistic designs of the architect, be they in regard either to form or colouring.

Hygienists have gone so far as to say that the *only* perfectly sanitary wall coverings are tiles or glazed bricks, and but slight reflection will serve to convince us that they are right. But no matter how 'warm' the colouring of glazed ceramic work, there is something 'cold' in the appearance of a glassy surface. This, however, immediately disappears with the glaze. It has become more and more the fashion to paper our walls with 'self'-coloured paper-hangings—*i.e.*, those upon which the

patterns, if there be any, are of the same colour as 'the ground.' As to the restful effect of these upon the brain, compared with 'striking' patterns, or intricate patterns, or vivid patterns, or geometrical patterns—the units of which one is everlastingly counting—there can be no question, and we now, more than ever, require restful homes. But the nearer we get to uniformity of colour, the nearer we get to plain brick or tile work. Now with regard to the surface, for living-rooms and bed-rooms,* this need not be glazed, and nothing finer, softer, more pleasing or more subdued, is to be found than the surface of 'biscuit-ware' porcelain, the delicacy of tint in the colouring of which now rivals that of wall-paper colouring. Friezes, cornices, mouldings, dados, dado mouldings and fittings, plinths and skirtings, now can all be made, and in any colour, of such. The walls of our dwellings thus ornamented would constitute sanitary perfection, and though they might cost more than when otherwise treated, the cost of upkeep would be reduced to *nil.*

The foregoing remarks have been directed towards improvement in house construction, as related to those of the larger and more costly type, this being the right end at which to begin; it must be left to ingenuity to combine as many improvements and advantages reaped from them in regard

* It is, of course, better to have the tiles glazed in certain other positions, especially kitchens and sculleries and all places where they may be subjected to the bespattering of grease.



A Vestibule entirely in Ceramic Work.

A fine Example of Terra-cotta Work : the Hotel Russell, London.

to houses of smaller and again smaller prime cost and rentals.

Having provided for an efficient system of ventilation, the next most important thing is an apposite system whereby the dwelling may be comfortably heated and, moreover, the temperature controlled and maintained at an equable degree *day and night.*

In regard to the larger houses I feel that the cost of electricity, if properly carried out in Garden Cities, will be such that, at last, the inhabitants will be able to avail themselves of *the most perfect* system of heating Science has yet put within reach—a combination of hot-water circulation with electro-thermal radiation. The former for the general—or, as it might be termed, 'cubical'—heating; the latter—principally employed for its cheering effect—for radiant and 'local' heating. Such a combination would be as near perfection as we are likely to get, for it would fulfil all the principal requirements of hygiene: (*a*) obtaining an equal temperature *throughout* the dwelling; (*b*) a means of obtaining absolute control over temperature; (*c*) obtaining a continuously equable degree of heating (day and night); (*d*) attaining the advantages of cheering effect; and, lastly, a system in which *no products of combustion* are given rise to—one, moreover, constituting in itself a system of *ventilation*, and capable of removing the products of respiration and defœdated air otherwise caused.

The heating of the smaller houses, in all probability,

will be by means of gas-fires of incandescing material emitting no products of combustion and used in an open chimney—the only scientifically correct principle embodying non-vitiation with automatic ventilation. It is also the most cheerful method of domestic gas-grate heating. In regard to better-class houses, I assume these will be uniformly heated upon the thermo-syphonic water circulation and radiator principle, centrally heated by gas, the incandescing electric-fires in this case being employed merely for ventilation and their cheerful effect.

The system of heating by circulation from a central fire—in basement or outhouse—is both economical and scientifically correct, and hence is very extensively employed in America and Canada, where houses are not only more uniformly but much more highly heated. Within the last few years it has made rapid strides in Great Britain in houses of moderate size; but in regard to smaller houses, an objection has been urged against it, on the ground of the attention required to be given to the furnace to obtain uniform heat. Usually either coke or anthracite is used as fuel, in order to reduce the need for attention to a minimum; but it will be at once apparent that the use of solid fuel cannot approach in uniformity of heat-emission the satisfactory effect of gaseous fuel consumption.

I some time ago inquired with much pleasure and interest into the automatic working of coke and anthracite systems upon the Continent, in which

quasi-uniformity of combustion and compensation for variation in atmospheric temperature is attained by the electrical automatic opening and closing of the ash-pit. Here, again, it need scarcely be mentioned fuel-gas lends itself most easily to such control. All that is necessary, indeed, is to mechanically connect an electrical thermometer with the gas-supply cock, near the central gas-furnace, to secure uniform heating entirely without supervision.

What has been said above as to even maintenance of temperature in dwellings applies even more forcibly in regard to the heating of glass houses and conservatoria; for if, for example, during the night a frost should set in, the gas will be automatically lighted, and the temperature raised to any predetermined extent. Seeing that it is anticipated Garden City will become a great centre of intensive market-gardening, the latter consideration is likely to become one of much importance.

A few words would be appropriate here concerning the lighting of the City and village dwellings. No illuminant in its hygienic attributes its universal applicability and safety, in any way approaches the perfection of the electric light hence, electric lighting will doubtless be adopted for internal illumination. With regard to street lighting, however, one point merits consideration —viz., as to whether electricity will prove the most suitable from the point of view of economy. For it must be remembered that, as no City has

yet adopted the method of supply I am advocating (see Chapter IX.), there are no civic mains charged with non-illuminating gas, and therefore engineers have not been called upon to design special burners suited to the consumption of weak and non-carburetted gas. In this relation, I should like to say that, from numerous experiments made by myself, I feel that no difficulty will be experienced in the production of such burners.* It should, however, be borne in mind that illumination by such means is likely to be 'large unit' lighting—that is to say, the burners will of necessity be each of considerable candle-power. Therefore, lighting by means of fuel-gas, whilst being exceedingly economical and admirably adapted to the lighting of broad thoroughfares, will not be so well-suited for the lighting of interiors.

With regard to internal illumination, this—both as regards private house lighting and the illumination of factories and mills—will, it is hoped, be carried out entirely by electricity. This remark is made in the interests of the health of the inhabitants, the atmosphere of whose homes, it will thus be seen, will be vitiated only to the extent due to the exhalations of their own lungs. How important this is may be emphasized by my reminding members

* The outcome of these experiments was the development of burners in which both the gas and the air were '*superheated*' before combining, and a concentration—or compression—of the flame *after* ignition. The result was the production of a pure white flame of great brilliancy with a consumption of gas of *less than one-half* that required in the ordinary mode of combustion.

that each gas-burner is equal—in oxygen removing power and vitiating effect—to the presence of five additional persons.

Some years ago I calculated the comparative vitiation of the atmosphere by various illuminants, and it may be interesting to reproduce the table here:*

PRODUCTS OF COMBUSTION FROM VARIOUS ILLUMINANTS.

	1. CO_2.	2. N_2O_4.	3. S.	4. H_2SO_4.	5. H_2O.	REMARKS.
	Grains.	Grains.	Grains.	Grains.	Grains.	
Electric arc	6,413	8	trace	—	none	Traces of cyanogen.
Gas No. 1	852,929 = 122 lb.	trace	333*	1,019	286,848 = 41 lb.	Ordinary burner, average gas; traces of carbon monoxide.
Gas No. 2	339,889 = 48½ lb.	trace	125*	382	107,568 = 15·3 lb.	Siemens' burner.
Gas No. 3	102,938 = 14·7 lb.	—	—	—	water vapour, 309·37 cubic feet.	Incandescent mantle.
Paraffin oil	573,040 = 73 lb.	none	trace	trace	2,683,000 = 383 lb.	—
Candles, No. 1 ...	1,410,860 = 201·5 lb.	none	none	none	5,760,000 = 823 lb.	Sperm.
Candles, No. 2 ...	1,141,514 = 163 lb.	none	none	none	6,336,000 = 905 lb.	Paraffin.

* Combines with O to form SO_2, and this combining with O and H_2O forms H_2SO_4.

Since this table was compiled, Dr. Auer has invented the incandescing gas mantle—a contrivance enabling non-illuminating gas to be used for the purposes of illumination, and at the same time

* Sennett on 'The Electric Light' (scholarship paper), *Minutes of Proceedings, Inst. C.E.*, vol. lxxviii., 1883-84.

effecting such a degree of economy as to bid fair to revolutionize gas-lighting as carried out by the carburetted gas flame. In regard to the amount of oxygen withdrawn from the atmosphere and the products of combustion evolved, the incandescing mantle burner is far superior to any other form of gas illumination; and this is very interestingly shown by the following table, very kindly prepared for me by Professor Vivian B. Lewes, who remarks, in addition, upon the subject of its relative hygienic value, that, although he has frequently found traces of carbon monoxide* from ordinary gas flames, he has never been able to detect any from the incandescent burner.

AMOUNT OF OXYGEN REMOVED FROM THE ATMOSPHERE AND CARBON DIOXIDE AND WATER VAPOUR GENERATED IN GIVING AN ILLUMINATION EQUIVALENT TO SIXTY-FOUR CANDLES BY VARIOUS ILLUMINANTS.

Illuminant.	Quantity Burnt, cubic feet.	Oxygen Used, cubic feet.	Products of Combustion.	
			Water Vapour, cubic feet.	Carbon Dioxide, cubic feet.
Sperm candles ...	6,960 grains	38·54	26·24	26·24
Paraffin oil ...	3,968 „	24·96	14·08	17·92
Gas (16 candle):				
Batswing ...	22 c. ft.	26·12	29·44	11·52
Argand ...	19·4 „	23·04	25·60	10·24
Incandescent ...	3·7 „	4·39	4·95	1·92

* Carbonic acid gas, better called 'carbon dioxide,' is irrespirable, and hence asphyxiating; carbon monoxide is a deadly poisonous constituent of gas or of the products of combustion therefrom. When carbonic acid gas is derived from respiration, headache and giddiness are produced in many persons when the

In order to show the value of the reduction in consumption of gas burnt upon modern principles, we have only to consider the diminution in the amount of heat imparted to dwelling-rooms. For this purpose, let us take the hypothetical case of a large enclosed space—50 feet square by 20 feet high, from which no loss of heat can take place—to be illuminated for ten hours by a light equal to that given by 4,000 standard candles, the light being produced respectively by the electric arc, by incandescent electric lamps, by incandescent gas-burners, by ordinary gas-burners, and by candles. At the end of the ten hours the temperature of the atmosphere of the chamber would be raised :

	Cent.	Fahr.
By the electric arc	0·70	1·27
„ incandescent electric lamps ...	7·00	12·60
„ „ gas-burners ...	13·18	23·71
„ ordinary gas-burners	78·40	141·00
„ candles	190·00	342·00

In other words, if at the commencement of the ten hours the atmosphere of the chamber had been

carbonic acid amounts to 0·15 per cent. With such air are, of course, always associated organic impurities, due to the processes involved in respiration. An atmosphere not pulmonically defœdated may be breathed in comfort when containing 0·2 per cent. of carbonic acid. Carbonic oxide, on the other hand, is rapidly fatal when its presence exceeds but 1 per cent., and has poisoned when but half that percentage was contained in air. These facts serve to emphasize the wisdom of carrying out the suggestion I make elsewhere—that all gas-pipes should be kept outside buildings.

at the ordinary temperature—16° Cent. or 60·8° Fahr.—then at the expiration of the ten hours it would have been raised :

	Cent.	Fahr.
By the electric arc	16·7	62·1
„ incandescent electric lamps ...	23·0	72·9
„ „ gas-burners ...	29·1	84·5
„ ordinary gas-burners	98·4	201·8
„ candles	206·0	402·8

From this we see how greatly the difficulty of maintaining cool workshops, meeting-places, theatres, as well as private rooms, is increased by the use of an ill-chosen illuminant.

This remark also applies to the vitiation of the atmosphere from artificial illumination, for if we refer again to the hypothetical chamber and to the table of the products of combustion, it will be seen that it would have been necessary, in order to reduce the amount of defœdation of the air as regards CO_2 to the standard of that of a manufacturing town, to have changed the whole of the air in the chamber during the ten hours, as given in the second column. The first column shows the relative amounts of CO_2 produced by various illuminants, whilst the second gives the number of times it would be necessary to have changed the air during the ten hours in order to keep down the percentage of carbonic acid to the standard of manufacturing air.

In regard to the electric lighting of the factories and workshops, the arc electric lamp will be the form most extensively used, as it is the form found

	Relative Amounts of CO_2.	Times.
For the electric light	1	$3\frac{1}{4}$
„ gas (No. 1 in Table), ordinary burner and average gas	133	500
„ gas (No. 2 in Table), Siemens' burner	53	200
„ gas (No. 3 in Table), incandescent burner	26	83
„ paraffin oil	80	300
„ candles (No. 1 in Table), sperm ...	220	830
„ candles (No. 2 in Table), paraffin ...	178	670

most economical for the illumination of large spaces. The electric arc is both a healthy and cool* illu-

* The question why such intensity of light is procurable from electric arc lighting with the evolution of so little heat being so frequently asked and the reason obscure, it may be advisable to refer to the cause. The thermal effects of the electric arc, as of all other sources of light, are due far more to the rays of longer than to those of shorter wave-length, but with the electric light they are very pronounced. The ratio of the invisible to the visible radiant energy of the sun is about as 2 to 1, whilst in the electric arc it is nearly as 8 to 1 (Tyndall). The area of the incandescent body in the electric arc is so diminutive when compared with the area necessary to produce an equal amount of light from gas, oil, or other source, that although the temperature of the former is so much more elevated than that of the latter, yet the rise in the temperature of the surrounding air, due to convection, is infinitesimal when compared with that due to gas and other sources of illumination producing a light of equal power. In order to illustrate this, the electric arc may be viewed as an ordinary

minant, as will be seen from the tables, and in Garden Cities should be available at a specially economical rate, for reasons I have given in Chapter IX.

From such considerations it is to be assumed that in Garden Cities illuminating gas will not be manufactured, and that, although non-illuminating gas will be largely used, it will not be employed as an internal illuminant. This being the case, it will be seen at once that a way is open to us to install gas in our dwellings in a much more convenient and healthful manner. Up to within the last few years it was the practice to carry out the drainage *beneath* our dwellings. This, it has dawned upon us, is so dangerous a proceeding that it is now not only condemned, but prohibited. Now that we have it in

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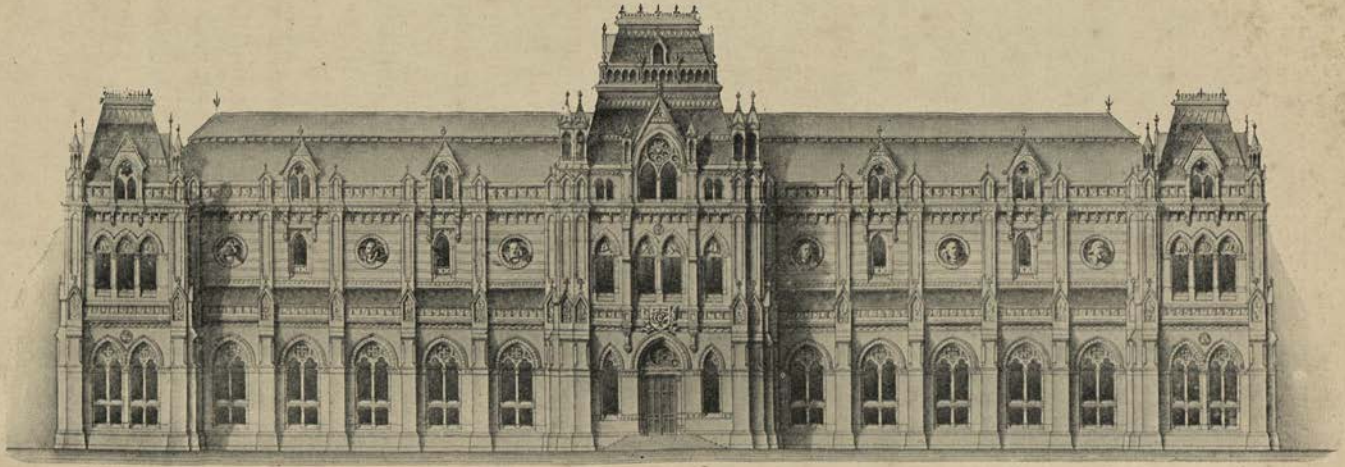
domestic fire, from which nearly the whole of the air deriving its heat by convection passes away by the chimney, since in the arc the heating by convection may be nearly neglected. The remaining energy is spent in communicating oscillating movements to the luminiferous ether. The waves thus produced do not heat the air in their passage through it, but are converted into heat only when they traverse an absorbent medium, or impinge upon the walls, ceiling, floor, etc., of the apartment, and it is from these latter that the air derives an increase of temperature. The heating effect, then, of the electric light in an open space may be said to be *nil*. In a confined space a rise in the temperature of the air will take place proportionate to the energy expended in the arc. Since, however, the amount of light produced per unit of heat so expended is so much greater than by other means, the air will receive a much smaller increment of heat by this than by other methods of illumination.

our power, we ought also to condemn the system of running gas-pipes in the interior of our dwellings. It is costly in repair, dangerous, and unhealthy. Gas should only appear in the fireplaces, and thither it should be led *outside* our dwellings.

I have dealt with heating and lighting because they are subjects—especially the latter—of vital import. Artificial lighting is of equal importance with the day-lighting of our dwellings, not only from the point of view of deterioration of the eye-sight, but also of the general health of the inhabitants of towns. I have dwelt on it also at length in regard to Garden Cities because in its most scientific aspect the subject can only be economically brought up to date in a new town. In this relation I heard but a few days since with something akin to horror the announcement made by Mr. Howard—who never tires of casting vituperation upon the shortcomings of our existing towns—that the clock of science is to be put back in regard to the First Garden Cities, and that the immense advantages—both hygienic and industrial—modern science is able to confer will be denied to the inhabitants. How inconsistent this is with his eternal lecturing throughout the length and breadth of the country that 'slums are to be emptied' and workers moved out at once to sanitarily perfect workshops and healthy homes is at once apparent. The wild and trashy nature of this reformer's engineering, however, is well known, and it is to be hoped will carry no weight with directors,

who should wish to exonerate themselves from the stigma of working upon the feelings of others for the advancement of their own projects.

With these remarks, intended to direct attention to ways and means, now within our reach, of increasing the healthiness of our homes, I must quit the subject of Garden City Dwellings.



Proposal for the Façade of a Garden City Technical Institute.

PUBLIC AND OTHER BUILDINGS

REFERENCE to public buildings may be of the shortest, for the reason that the public buildings of Garden Cities are not likely to differ very materially from the public buildings of existing cities. There is, however, one point in connection with them which should not be overlooked, that is that the conditions would enable them to be designed to exactly fulfil the municipal requirements; for the reason that the populations are to be limited, and hence the maximum degree of accommodation will be known from the outset. Now, seeing that the populations are to be restricted to a very moderate number, two things are made clear to us: (*a*) that the public buildings of Garden Cities will only require to be of moderate size, and (*b*) that to build separate buildings for separate departments of public service would in these circumstances be a wasteful mode of equipping the City in this respect. Sometimes concentration is quite as valuable as decentralization, and this certainly applies to the municipal and administrative buildings of cities, just as it should do

in regard to Government departments. In London, for example, these latter are to be found fairly well concentrated; abroad it often happens that one wastes much valuable time in going from one office to another.

In a Garden City the whole of the administrative buildings should be under one roof, and even then, if careful proportionment and economy are to be studied as they should be, such an agglomeration would not produce a very imposing building. Therefore, in order that increased economy should result, I would advocate that the buildings required for other public services, beyond those of municipal administration, should be aggregated into one centrally placed building, which, by this means, could be caused to become imposing. This modus would present many advantages, amongst them being economy in construction, economy in maintenance, and economy in the time of those making use of them, as well as material economy in the *personnel* necessary for the joint working. We have an example of this in regard to the Imperial Institute, London. Here we have the case of a building proportionate, in its size and majestic appearance, to the length and importance of the reign it was intended to commemorate. But this was subsequently found to be disproportionate to the amount of work carried on within it. Hence it became subsequently a building performing a dual office, for, in addition to its being the information

bureau of our vast Empire, it now provides a home for the University of London.

I would, therefore, strongly recommend—for the foregoing reasons—that from the first a somewhat imposing building should be designed in such a manner that it could conveniently, from time to time, be added to for the purpose of fulfilling growing civic requirements, and that from the first the inceptive portion should be made considerably larger than current requirements would warrant, so that during the early growth of the City such building could be utilized for purposes the requirements of which would subsequently justify separate buildings. For example, we may take the instance of the first Garden City, for which I have laid out a proposal. This, as in the case of every other town, could not *too soon* become possessed of the following requisites of modern civic life: Firstly, municipal offices; secondly, a technical school; thirdly, ordinary schools; fourthly, a lending library and reading-room; fifthly, a reference library and reading-room; and sixthly, a music-room or concert-hall. Now, to provide all these six things even during the first three or four years of the City's existence—if they were to be provided in proper proportionment to ultimate requirements—would constitute not only lavish but wasteful expenditure of money, yet, on the other hand, it would be highly undesirable that the first comers and early inhabitants of the first Garden City should be kept even a month longer

without the amenities it would subsequently present than would be absolutely necessary. To obviate this without imprudent expenditure, it appears to me the only method open is to provide buildings for *certain specific* purposes, but in the meantime to use them for *other* and *collective* purposes.

In order to surmount an engineering difficulty, I have already suggested a peculiar mode of construction of a central building, intended subsequently to play a multiple rôle. The object, it will be remembered, was to obviate the heavy expenditure of building an isolated water-tower. The plinth or base of such building was to be the future home of all the municipal offices, and I cannot too strongly urge from other considerations—namely, those now occupying our attention—that this base, which, for a time, it will be remembered, was to play the part of 'Terrace Gardens,' should be laid out on a broad and liberal basis, and to contain spacious rooms properly thought out and proportioned to certain specific (but future) purposes, but which in the meantime could be used for some of the six purposes to which I have adverted.

In order that the City should be supplied with *all* these *desiderata from the very commencement*, I would advocate the taking of the following course: The number of shops required in the City will obviously increase with the number of its inhabitants. I would suggest advantage being taken of this fact in the following manner: A description

of the Colonnade to consist of all the principal shops of the City will be found in the next few pages. I would recommend that at least one complete side of this mercantile quadrangle should be built forthwith, for, if built upon the metallic system of construction I advocate, the partitioning off of the individual shops would, in any case, be carried out subsequently to the erection of the building. Now, if the whole side of the Colonnade be erected at once (whilst being too large for the incipient mercantile requirements), the undivided portion of the building would form an admirable substitute for the future concert-hall, whilst the larger subdivisions of it could be utilized as a reading-room and schoolrooms. The unlet shops, moreover, would serve very well *pro tempore* as classrooms for technical instruction.

Feeling that it is of greater value to direct the reader's attention to a concrete suggestion rather than to deal with vague generalities, I will here describe my proposal in regard to a building intended to perform a number of useful functions, when the whole shall have been consummated.

At first a massive, though stunted, building would be erected, having the appearance shown in the illustration; this would be of sufficient height to provide lofty rooms to be used permanently as municipal offices, and also as class-rooms for the Technical College and for other purposes of meeting. Its walls would be of adequate strength to carry the superstructure to be subsequently added, and

these would be surrounded by an ornate arcading some 5 feet or 6 feet wide, with the dual object of relieving it of 'flatness' and of providing a balustraded balcony to the completed building. The centre portion of this dwarf building would contain a quadrangle about 40 feet or 50 feet square, rising from which would be an imposing staircase, at first giving access to the 'roof-garden,' but subsequently to the upper portion of the building. This quadrangle would be entered by bold doorways from front and back, the former being exactly upon the centre line of 'Grand Promenade,' the latter upon the centre line of the centre walk of the 'Colonnade Gardens.'

Later, upon the walls of this plinth building—*i.e.*, 5 feet or 6 feet back from the balustrading—would rise the upper part of the 'Capitol.' The erstwhile quadrangle would then become the 'grand staircase' of the building, its ceiling being the ornamented base of the great water-tank. The inner balustrading of the 'Terrace Gardens' would become the balustrading of the landing or balcony projecting around the 'central hall,' and from this landing would lead off the corridor, which, as has been explained, would be in connection, *under cover*, with all other public things of the City. A further description, I feel, is unnecessary, as the illustrations will probably prove sufficiently explanatory. The combination might, of course, be carried out in several styles of architecture, with or

without a roof garden, in addition to the terrace balcony as shown.

I will say nothing in regard to public buildings generally, such as theatres, concert-rooms, music-halls, and the like, except to impress the necessity of *far* more efficient ventilation being provided for such, and also the necessity for making suitable provision for checkmating this taciturn and erratic climate of ours. One cannot too strongly urge the value of *al fresco* entertainment; a form, for obvious reasons, resorted to so much more extensively abroad than at home, but happily yearly increasing in extent with ourselves. An antidote to our fickle climate should certainly be sought. It is at once found in the 'rolling roof.' I commend this, most seriously, to the attention of English architects, with the friendly hint that they should take a much broader view of the requirements, and not deal with the matter in the half-hearted manner they have hitherto, as exemplified in the pigmy 'sliding roofs' of some of our places of entertainment in London. To find the system enterprisingly carried out, we have again to look abroad. Long before the electric motor made its appearance as a public servant, Paris had its *toiture roulante*, for the vast canopial covering of the colossal Hippodrome was made in two halves and mounted upon wheels and rails; each half was provided with a small steam-engine, and upon any change of weather or threatening upon its part these little locomotives ran the roof either over the

audience, or disembarrassed them of it, and extended their view to the clear and starlit sky. To-day all we have to do is to build the roofs of places of public amusement upon 'self-contained' lines, and to supply them with electro-motors suited to the electric-lighting mains of the district, and the turning of a switch suffices to at once convert the 'indoor' into the *al fresco*. In reference to the construction of Garden City factories, I have given in this chapter a drawing of an electric rolling roof.

I would wish to say one other word in regard to another public building which the municipality should not fail to furnish—the public baths. In order to preserve the public health, and to foster the acquisition of that valuable art—so necessary to us islanders—swimming, the swimming-bath should be available the whole year round, and not covered up for dances, as now so frequently obtains. This arises principally from the difficulty and expense of heating the water, and this again is in large measure due to defective engineering in regard to the problem. In a Garden City, if—as should be the case—the City control the supply of water, heat, and electricity, the cost of heating the water could be reduced to a minimum by various devices. But the faulty and exceedingly wasteful method of conveying the heat to the water should certainly be rectified. The problem should have been given a little thought, and to show what thought and perseverance can do, I would mention the case of the far more difficult

problem of *cooling* water by means of *air*, a necessary operation in regard to the motors of our modern horseless carriages. Five years ago to cool a *four* horse-power motor we had to carry a large tank containing *gallons* of water and adding a not inconsiderable weight; to-day, by means of *proper mechanical circulation*, we can cool, for an indefinite period, a *forty* horse-power motor with two or three *pints* of water, and we now carry no tank. What the public swimming-bath is lacking is what we have here been forced to provide—*proper mechanical circulation*. But to properly teach swimming, our baths also lack a *current to swim against;* the accompanying diagram will serve to explain how these shortcomings may be made up in an inexpensive and thoroughly efficient manner. The bath, moreover, would be a far more healthy one, for it would be constantly and continuously cleansed by oxygenation.

I have ventured to suggest that the success of these novel Cities will depend largely upon the observance of the class distinctions obtaining *everywhere* else. This applies to almost all things, and bathing is no exception. Obviously there should be two classes of baths for the two distinct classes of inhabitants. Cogent reasons, such as those I have referred to, can be brought forward in favour of municipally-owned public baths, but I know of no weighty reasons for the extension of the system to such establishments intended for the well-to-do.

Therefore, I consider* there should be found in Garden Cities—or rather upon their outskirts—perfectly equipped hydropathic establishments, replete with all that is latest of hydro- and electro-therapeutic appliances. This 'hydro,' however, I contend, should be established by private enterprise, and in regard to such sanatoria, I will only draw the reader's attention to the calculations anent town and country buildings in the appendix to this chapter, from which it will be seen that financial deductions most clearly point to the advisability of building such establishments either *qua* 'bungalow' or, in any case, *not exceeding one story* in height.

Now, if we pause to consider the requirements to be fulfilled—especially in the case of invalids—we shall at once see that nothing could be better calculated to fulfil them than the 'bungalow' or 'single story' design. Fortunately, also, as will be gleaned from the remarks anent ventilation, hygienic conditions are all upon the side of the ground-floor type of building. Hence the hydro of the first Garden City should certainly be built in this manner, and made replete with all the entrancingly interesting and recently developed therapeutic radiatory apparatus, both calorific and electric. If we ask ourselves why, upon the inexpensive land of Scotland, huge 'hydros' should have been reared in which one must needs go to bed upon the *fifth* or *sixth floor* and descend to cold and clammy cellars—

* See also Chapter V.

striking a chill to one's very bones—in order to get one's health-restoring bath and 'treatment,' when both bed and bathrooms might be upon the same level with the bright flower-gardens around which the sanatorium would be ranged; in which, moreover, instead of groping in dark passages and bathing in basements, every bathroom, cooling-lounge, reading-room, and 'treatment'-room, might be supplied with abundance of light by means of 'skylights,' we can only conclude such buildings were entered upon without sufficient thought having previously been given to the requirements and to the conditions to be fulfilled.

Shops, albeit for public use, cannot rightly be classed as 'public buildings'; nevertheless, there are very cogent reasons why some of these, at least, should be built by the City, not the least important of such reasons being that, with a little thought, such municipally-built shops might be made to constitute both a 'feature'—a place of pleasurable public resort—and a great convenience to the inhabitants. Moreover, means would be at hand for setting an example in regard to how such emporia should be built, and how hygiene in regard to them should be dealt with; for if it be proper—and an absolute necessity for the preservation of health—that great care be exercised in regard to the storage of edibles in our own homes, how much more necessary is it to take similar precautions in regard to shops!

In this regard I would impress the advisability of

discarding woodwork as much as possible, replacing it by metal, as well as the extensive introduction of glaze brick and tile construction and ceramic ornamentation. By the courtesy of Messrs. Doulton, of Lambeth, I am enabled to reproduce the illustration of a building *entirely constructed of pottery-ware*—one, as will be seen at a glance, well adapted to play the part of a very high-class emporium, to contain and display either edibles or other wares. The building, consisting of a range of shop-fronts connected with a deep and handsomely ornate facia surmounted by a balustrading, was, in reality, the pavilion exhibited by them at the last Paris Exhibition. I am also able to show typical panels in ceramic work, which make it clear that, whether such hygienic decoration be required for the household wall, the dairy, the butchers' or other shops, the Town Hall, or the Hospital, the art of the potter is equal to the task of fulfilling every want.

I would therefore advocate that a moderate number of shops should at once be erected—especially having regard to their suggested temporary use as explained on page 351—that these should be made to form a feature of the City, by so designing and arranging them in a colonnaded parallelogram enclosing a spacious public garden, that they should form a pleasant *rendezvous* for the inhabitants and visitors making use of such emporia.

A very gratifying improvement has of late manifested itself in regard to the design and construction of shops. Space will not permit of

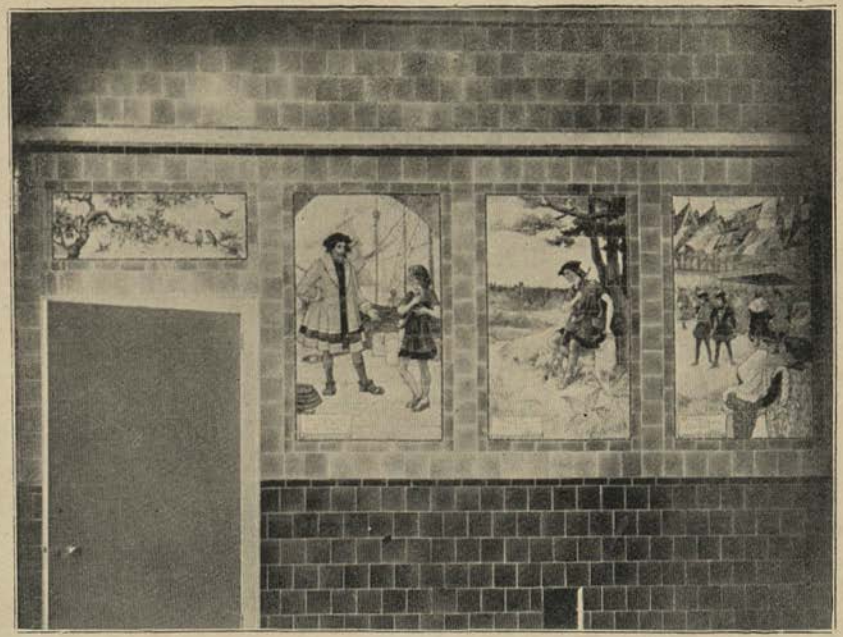
A Shop entirely in Ceramics—the Exhibit of Messrs. Doulton in the Paris Exhibition of 1900.

Single-fronted Shop, Old Style.

Double-fronted Shop, Old Style.

Single-fronted Shop, Modern Style.

Multiple-fronted Double-tier Shop, Latest Style.



Tile-work Wall in the Children's Ward, St. Thomas' Hospital, London.

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reference to this, and I therefore present a few pictures illustrative of evolution in shop design. A remarkable *Parisianization* of the London shops is now taking place, both in regard to their construction and to the display of their wares, and this should be welcomed and carried into effect in Garden Cities. But the 'last word' in regard to shops appears to be the 'double-tier' shop, and this is the form—having regard to the remarks I have ventured to make concerning the colonnade in Regent Street, and the efficiency of daylight shop-lighting—I would strongly advocate, because, as will be seen from the drawings of the colonnade with its 'lock-up' emporia, the upper tier could be efficiently lighted by means of skylights, whilst the ranging of the *piazza* roof *level with the main roof instead of the facia* gets over the trouble hitherto experienced in regard to defective illumination of the goods.

The architecture of 'the Colonnade' is capable of much diversity, the sketch given being merely typical; but in any case, I would recommend the structure to be metallic, the cast-iron embellishment of the veranda to be in the light, intricate, and lace-like style, so that when painted* in 'ivory' white it would have the appearance of having been carved in that admired material.

The 'Colonnade' needs no lengthy description.

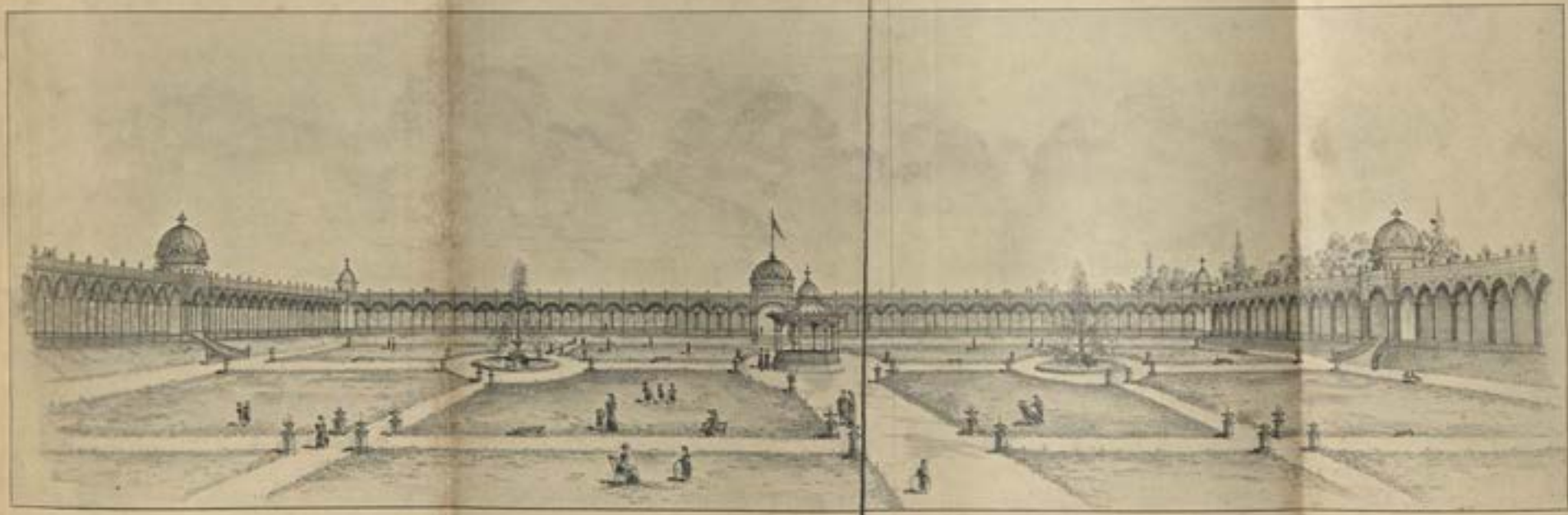
* In order to do this cheaply, this should not be done by hand, but by the *pneumatic* system now employed in painting bridges and other engineering work, as well as the saloons, etc., of our large ocean liners.

It would be a pleasant sheltered portion of the City, a large rectangular 'Italian' garden laid out with lawns profusely studded with flower-beds. Around this florally-enlivened space would run a continuous colonnade, the balustraded 'terrace' of which, as is elsewhere mentioned, would be at rather a higher level than the gardens, but connected with them by sloping margins of well-kept grass. The terrace would be the equivalent of the ordinary pavement outside the shop-fronts. The shops would have 'half-basement' storage, and these stores would be entered from the half-basement corridor, of which the floor of the terrace would form the roof. In addition to keeping the shops perfectly dry, this 'service corridor' would present the further advantage that goods would not have to be delivered to or passed through the shops, nor would the terrace be used for the purpose of unloading and unpacking, and thereby be subjected to soiling and littering, which so frequently constitutes a matter of inconvenience in regard to our ordinary pavements. Just as the roof of the Capitol might be used as a roof-garden, so might the roof of this Colonnade be used as a balcony promenade, and for this purpose it might be glazed with prismatic lights.

Every thought should be directed to providing new Cities with new expedients of public advantage; such thought, moreover, should be concentrated upon ways and means of making such expedients profit-returning. The vast arcades of Buckingham and the colossal Crystal Palace of Howard would

THE COLONNADE.

The view of this portion of the City shows the Colonnade and the Gardens contained within it, as seen from the Gallery in the rear of the Capitol. The quadrangle thus formed is entered at its centre walk from the grand staircase and great hall of the Capitol, or at its lateral walks by passing under the 'Rialto' bridges, one of which is seen in the frontispiece of the volume to the west of the building. The west wing of the Colonnade is formed entirely of shops, the interior construction of which is shown in the cross-section (p. 362 A). The north wing also has shops, but its extremities are formed by a hotel at the one end and a restaurant at the other. The central portion is the railway-station. The east wing north of the Cupola is formed by the School of Art, separated by a vestibule beneath the Cupola from the Art Gallery, which continues southwards as far as the Kursaal, which stands to the east of the Capitol, and is connected to it by a bridge to match that seen connecting the west wings of the Capitol and Colonnade.



The Colonnade and Gardens

certainly constitute such; but these would entail enormous annual expense upon the community. A centrally-placed public bazaar, however, such as the 'Colonnade' I suggest, could, on the other hand, easily be made profit-earning. I am indebted to the courtesy of Messrs. Walter Macfarlane and Co., the celebrated engineering art-founders, for having worked out the figures of cost of the somewhat elaborate colonnading I present in the illustration; one, as they point out, which could, if though desirable, be carried out in a far less expensiv manner. Assuming, however, such an elaborate an ornate mercantile feature to be provided by the City the cost would be about £5 per foot run, included i this sum being the railings of the colonnade, th upper balcony and promenade, the flower-vases, an all other ornamental embellishments.

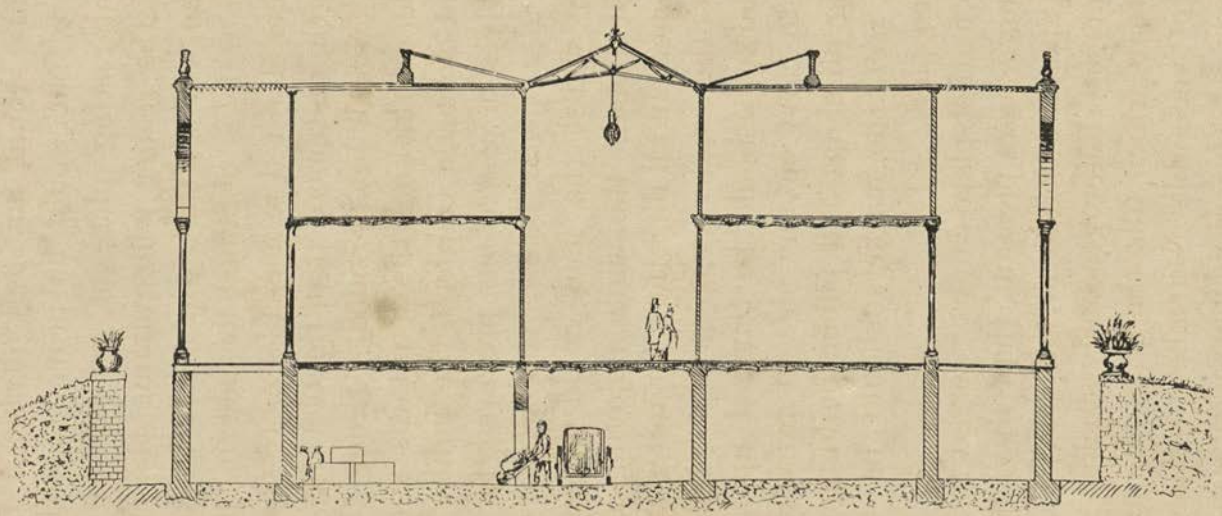
Now, a very bold shop-front—especially in th design presented, where none of the show frontag would be wasted by the intrusion of a doorway seeing that the shops are entered from the centra corridor—would not exceed 15 feet in width. This then, would represent a capital expenditure of £7 per shop, and, allowing 6 per cent. interest upon th capitalized sum, this would only increase the renta by £4 10s. per annum. Where is the shopkeepe who would not be willing to pay several times tha sum for the value of such an attraction, and th means of enabling his purchasers to visit him i comfort in all weathers?

In this manner the centre of the City would

present a novel and pleasing feature, and its inhabitants would not only derive a material convenience, but would be provided with a pleasant and interesting place of *rendezvous* and resort. For, if the reader will examine the cross-sectional view, he will see that, whilst a lofty covered arcade 10 feet wide is obtained for use in bad weather, a very fine elevated promenade, more than 500 yards in length, and more than double the Colonnade in width, would be provided. From this fine promenade, overlooking the fountains and flower-beds of the Colonnade Gardens, the ladies could disport themselves in *confections* prepared for them in the *salons des modes* below, the while enjoying the music; whilst the men could enjoy their daily 'constitutional,' the while enjoying fine vistas of the scenery in all directions for miles around.

One other, and very important, public building—the market—should be touched upon, because, in order to carry out my idea of providing means of visiting all shops and public buildings in the City *under roof*, the markets should be built upon a modified plan.

The market-place can be referred to in few words. Nothing is more pleasant than to visit the market-places upon the Continent, to stroll, for example, amid the immense heterogeneously stocked assemblage of little tents which fills the great and ancient *Markt-platz* of venerable Nuremberg—something in the nature of a *replica* of which we have in our old great market square at Nottingham, the largest in the



Cross-section of Colonnade Shops.

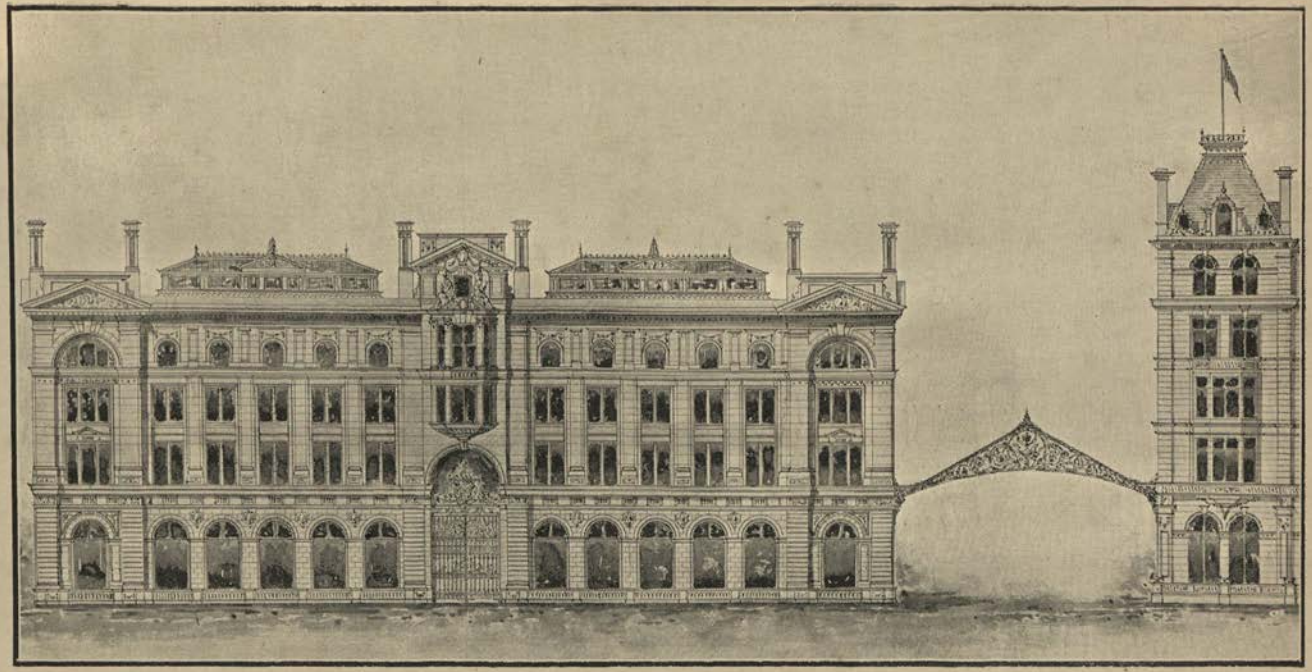
kingdom—or to saunter through the flower-bedecked, open-air market piazzas of Italy. Such things, however, are quite inapposite in our own inclement climate, which calls aloud for *covered* markets. The picturesque open space of barter is productive of considerable hardship to the stall-holders, and is certainly not conducive to business. My remarks shall be confined to the covering of the market and the manner in which it should be supported. I would wish to impress, in this relation also, the view I have ventured to express in regard to the roofing in of arcades. The strength of a roof has to be calculated, proportionately to its span of course, principally in view of its having to carry a heavy load of snow. Now, the strength required is practically uninfluenced by the height—within reason—at which the roof is supported. Therefore its cost, also, is practically unaffected, and remains approximately the same. Hence, in the case of a roof supported upon columns, the difference in cost between a loftily covered and a lowly covered space is quite negligible in comparison with the hygienic gain and the abolition of that sense of depression a low roof invariably produces. In dealing with the cognate matter of covered shop pavements, I have shown that the fulfilment of the desideratum can be effected, not only in a simple manner, but in such a way that it should—instead of entailing avoidable expenditure—*produce a profit return* for the expenditure incurred. From the above remarks it will be seen that the difference in cost between

a lofty and enlivening market-place and a low and depressing one resolves itself practically into the difference between high walls and low walls. We therefore have to ask ourselves the question, 'Can the extra high walls be made to pay?'

In a Garden City, where there is everything to provide, and where everything provided should be the subject of the most careful thought, an answer is at once forthcoming, for the market shop-keepers and stall-holders *must* have their dwellings, and why should not these dwellings form the support—constructionally as well as commercially—of the market roof?

My proposal, then, is that the Agora of Garden Cities should consist of a quadrangle of buildings—one half of which should consist of commercial offices, the other of dwelling-houses—forming the support, not only for the market roof, but also for another similar roof extending from the block of offices to the railway-station, and, in turn, to the principal hotel and restaurant, and from these, again, as has been already explained, to all the other shops, as well as all the public buildings of the City.

The 'Agora,' as in the case of the 'Colonnade,' might conveniently be made to comprise in it, as a terse cognomen, the gardens and all other surroundings of the markets. This, again, it need scarcely be mentioned, might be carried out in any *suitable* style of architecture. An illustration of such an 'Agora' is given, so that I feel no further description is called for.



The Agora, Entrance to Railway Station and Portion of Station Hotel.

Interior of a Modern Engineering Works.

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THE INDUSTRIAL ZONE

'Th' invention all admired, and each how he
To be th' inventor missed; so easy it seemed
Once found, which yet unfound,
Most would have thought impossible.'—MILTON.

'Deduct all that men of the humbler classes have done for England in the way of invention only, and see where she would have been but for them.'—ARTHUR HELPS.

'The man who turns a weedy desert into a fertile garden, an idle stream of water into an instrument of industry and profit; who can press the idle winds into his employment and make them productive; who can make the steaming exhalation of boiling water move ships through the ocean against wind and tide; who can, with the same simple power, make ten thousand wheels revolve, which a million of men could not move, and with its almost magic aid convert our flax into fine linen cloth, and extract from the centre of the mountains their richest ores—these are the men who are the benefactors of the world.'—ALLAN CUNNINGHAM.

FROM the point of view of vitality—nay, of very existence—the essence of a Garden City must needs be its industrial centre. This must constitute the life-imparting *heart*, as it were, to the whole frame. In its productive ventriculation, its forceful and

continuous throbbing, must be recognised the vital energy to be imparted to and infused through the whole civic anatomy. From it must ramify the highways and byways of commerce, the arteries and veins to be, by it, supplied with the life-blood of progress and prosperity and kept in constant and recuperative circulation. The City's *vis viva* must spring from this if its life is to be kept within it.

Where, then, should this vital section of the proportioned and 'harmonious whole' be located? Theoretically it should be at its very centre. There are, however, practical, economic, and æsthetic considerations militating against this location. But the industrial centre of the City, though it may not be coincident with the topographical centre, should still be a *centre*, and I cannot too strongly condemn the proposal* that the industrial section should be attenuated and stretched out in a lengthy circle around the City. This is hygienically, commercially, economically, and expediently very imperfect. Hygienically fallacious because, no matter what amount of care may be exercised, disturbing noises and mephitic emanations and exhalations must make themselves felt from such an industrial girdle cast about a city intended to be a city of health—emanations and exhalations which must be ever present in the City, no matter from which direction the wind may blow. Reference to the diagram (see Plate) will serve to show that the

* That of Mr. Howard.

factories would abut upon the choicest residential sites, that such things, indeed, as 'coal-yards, timber-yards, stone-yards, boot factories, engineering works, and jam factories,' would dominate the whole of the broad and costly 'First Avenue.' The smell of the tannery and gasworks, the heat of the foundry, the clang of the engineering works, the buzz and hum of the mills, would indeed follow throughout its whole length the course of the 'Grand Avenue.' Commercially wrong because it perpetuates one of the gravest inconveniences and sources of loss in great cities, the loss of time and energy in getting from one place of business to another. Economically imperfect because of the enormous and quite unnecessary increase of expenditure it would entail in the laying of mains of all kinds, and in the supply of heat, light, and motive power. Expediently incorrect because it presents the maximum of inefficiency and inconvenience in regard to facility and cost of transport, and the supply and delivery of raw and manufactured merchandise, as well as of the approximation of the workmen to their work and their convenience in 'messing' and daily routine. The continuous circular railway, moreover, would be of no use in serving the various works unless supplemented by many sidings or expensive turn-tables, which latter would be very detrimental to its use as a goods trunk line. Even supposing it could be used, as shown, *without* sidings, its length, some four and

a quarter miles, would be most wasteful for the service of a few factories, all of which could be placed conveniently on five-and-twenty acres of land. If to this be added but one siding of like length, we should have nearly ten miles of railway to serve no other purpose than to deliver goods—in complete, or their equivalent, truckloads—to a few factories employing not exceeding 4,000 or 5,000 operatives, or about half the number of a single one of our largest factories. Apart from this, such a circular railway would prove an expensive inconvenience in regard to communication with the outside world, for not a single road could enter or leave it without the necessity of constructing costly bridges. To provide such for the twelve prolongations of the six *boulevards* alone would probably mean an expenditure of upwards of £100,000.

The acme of an industrial centre or section, which—having regard to the exigencies to be met—I have styled a 'zone,' is that it should be *compact* and *self-contained;* that it should be supplied with its own means of transport—the shortest and quickest possible—that it should possess its own goods railway, quite distinct from passenger service, such railway to be in direct communication with as many other railways as possible; and that the workmen's dwellings should be as close as possible to each and every one of the factories. The merest reflection will show that such axiomatic conditions are in no way best met by a lengthy and curved

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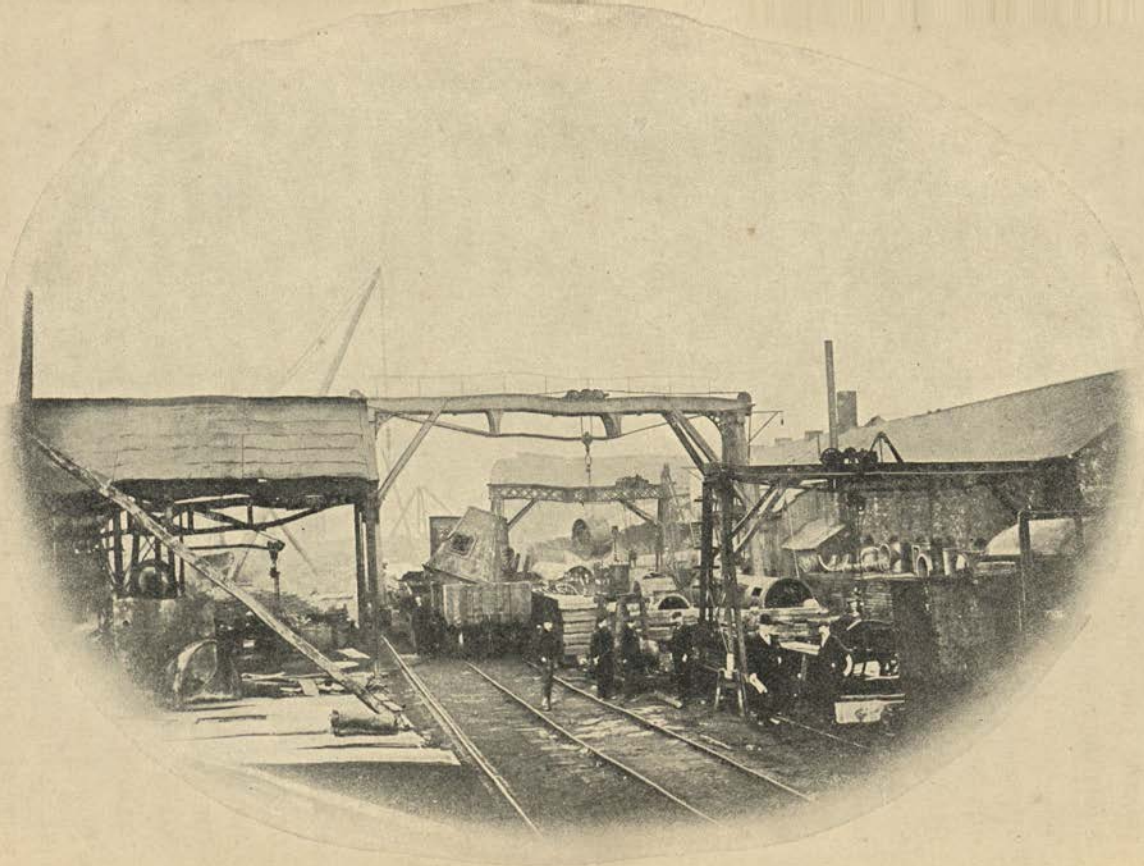
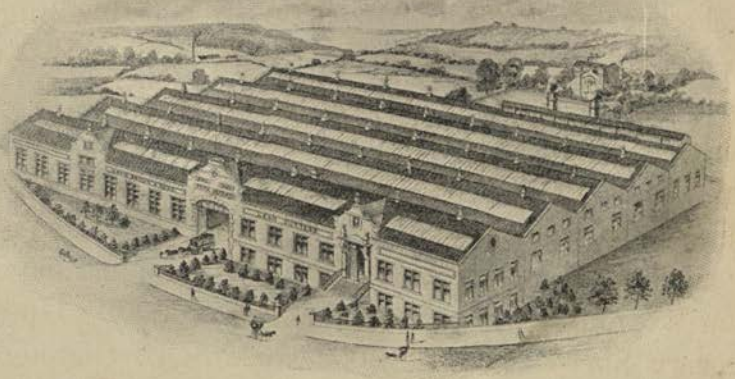
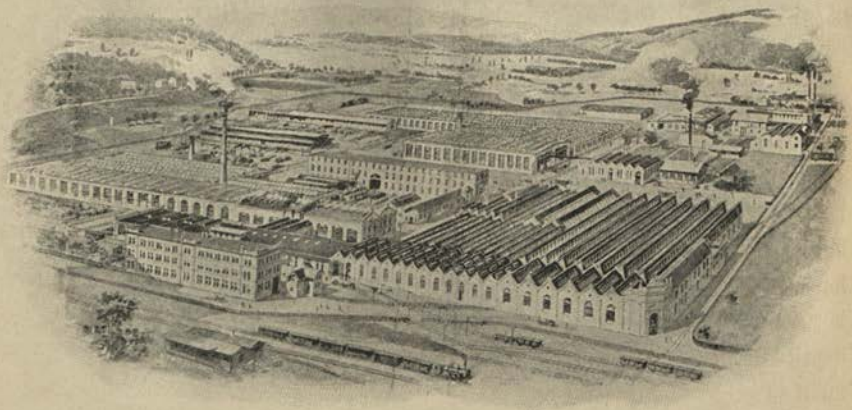


A Railway Siding with 'Travellers' in an Engineering Works.



An English Engineering Works—Ridge-roof Construction.



A Swiss Engineering Works—Weaving-shed Roof Construction.

chain of factories—miles in length. When, moreover, one considers how very small the acreage* of the factory zone is in proportion to the dwelling-area and City proper, it will be seen that such an attenuated disposition is as unnecessary as it is practically inefficient. For, taking a town having a total population of 25,000, comprised of private residents, commercial men, shopkeepers, and workmen, it may be assumed that the proportion of factory operatives would be about 5,000. Upon the very liberal scale of 200 workers to the acre occupied by factories, this would give a total of factory area of only 25 acres. Now, this could be comprised within a rectangle having sides of less than 350 yards in length, so that the greatest distance from the centre of this industrial square to its corners would not exceed 248 yards. By this will be seen the advantage of concentration, the disadvantage of attenuation, and also that a circular railway

* In calculating the acreage proper to be set apart for the industrial zone, the factor of 200 operatives has been taken. This is, of course, liberal, and probably two or three times as sparse as the working density of some of our existing towns. Even on this basis, however, a frontage of the length provided for, with a depth of only 150 yards, would provide factory space for 40,500 operatives—equivalent to a working population of 202,500. The space provided by Mr. Howard—viz., 150 feet in depth—is, on the other hand, quite inadequate for the emplacement of engineering works and suchlike.

The position shown—viz., upon the *inner* side of the circular rails—is unhappy, because, the plots being hemmed in between rail and road, all possibility of extension is precluded.

would be quite unnecessary in factory operations upon the scale which could be carried on in proportion to the restricted population of the Garden City.

In the laying out of the industrial zone I most strongly advocate that the system of leaving margins of land around the buildings should be adhered to in regard to the factories similarly to that in regard to public buildings, residences, villas, and cottages, and that, indeed, this should be made compulsory in regard to garden margins separating the works from the roadways; to facilitate this I would suggest that land be let to manufacturers upon two scales as to price, the one applying to the land actually to be covered by buildings, the other and lower rate to 'additional' land they are invited to take in order to keep their factories in the open, as also to the margins they must take compulsorily.

Happily, in this regard, I feel, nothing in the nature of compulsion will have to be exercised, for manufacturers already fully appreciate the wisdom of such a measure. In this relation, I may add that it has given me much pleasure to visit some, out of the many, works, the proprietors of which have invited me to inspect them. For the benefit of my readers photographs of these have been taken, and I here reproduce them. In these cases—where they have moved their works out from towns—we find that manufacturers have already, of their own initiative, purchased suitable areas of spare ground and laid them out as gardens.

Offices of Messrs. Willans and Robinson, Ltd., Rugby.

Works of Messrs. Willans and Robinson, Ltd., Rugby.

I will give a few examples as typical of the excellent practice of leaving gardens, not only in front of the offices, but in front of the works, and also between the offices and the factories. In doing so I will confine myself principally to engineering works, and to those of my own personal friends. One of the first firms to adopt it was, perhaps, Messrs. Willans and Robinson, Limited, the well-known engineers. The extensive garden in front of their offices—the façade of which, it will be observed, is of very pleasing elevation—is shown in one of the illustrations, whilst that forming the margin of the works, which, it will also be seen, possess again the merit of ornateness, is shown in another. As Mr. Robinson writes me in a strain exactly in accordance with my own views and those I am endeavouring to inculcate, I think, instead of description, I cannot do better than to insert his letter.

'VICTORIA WORKS, RUGBY,
'*September* 29, 1903.

'DEAR MR. SENNETT,

'I trust the accompanying photographs may be of some service to you. One shows the approach to the works' gates and to the offices; the time-office is the small building against which a man is leaning, and the testing department — to which engines go for examination after leaving the shops —is just visible on the right. The main group

of buildings is the general offices. The other photograph gives a view of the space in front of the works. It suggests that packing-cases are our chief floral decoration, but this is not so. You will see a little triangular piece protected by short white posts: that is the Fire Brigade's flower-garden, which just now is quite gay. The reason the packing-cases are all over the open space in front is that building extensions are going on behind the buildings, and these packing-cases are only in temporary position. We are always looking forward to the good day when everything will be perfectly tidy; it has not arrived yet.

'When we built these works we deliberately made them, as we considered, handsome in appearance, partly as an act of duty to the neighbourhood which we invaded, and partly because we believe that pleasant surroundings have a beneficial effect upon those who work in them, and tend to raise self-respect and the general tone. I believe those views have been quite well established in practice. The amount of money spent in making the buildings handsome rather than ugly was very small—a few courses of "dog-toothed" brickwork, projecting pilasters here and there, a symmetrical arrangement of windows, and the spending of a little money on the tower which contains the fire-tank, having, I think, done all that was needed.

'Yours very truly,

'MARK ROBINSON.'

Rugby has also been chosen by another large firm of engineers—the British Thomson Houston Company—but as the buildings are as yet incomplete, it was thought that photographs would not prove of great interest.

Chronologically, I believe the works of Messrs. W. H. Allen and Co., of Bedford, ought to have been first mentioned, for Mr. Allen tells me that that firm was the first to shift its works from the Metropolis well into the country, yet within easy distance of London.

This engineering firm, which was established in 1880, found it necessary, through the encroachment of the London and South-Western Railway Company, whose property adjoined the works at the bottom of York Street and Addington Street, Lambeth, to remove its works in 1894. After careful consideration, it was determined to leave London, and to re-establish the works in the country. A favourable plot of ground of thirteen acres was chosen, from its proximity to the Midland Main Line, as well as for the position and level of the ground, at Bedford. This site enabled the firm to build its works of a character of which all works should partake—namely, such as to offer every facility for subsequent extension and easy development with their growth, at the same time, such as would give a neat appearance. At all stages, the advantages of the country were kept

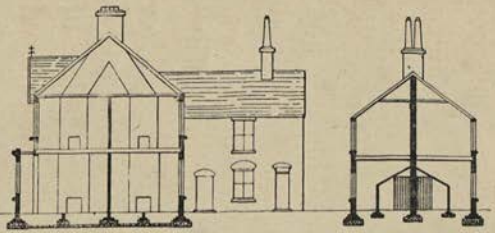
well in view, and every care was taken in the construction of the works so as to make the whole of the surroundings as pleasant and healthy as possible for the men.

The offices (see illustration) were set back from the road so as to form a garden of about half an acre, made pleasant by banks of shrubs. The space between the offices and the main building of the factory is covered with creepers on both sides, and is preserved open as a precaution in case of fire. The roofs of the factory are of the 'weaving-shed' type, lofty, and so designed that they give an ample air-supply for efficient ventilation, whilst the light is received from the north; this construction and disposition has the further advantage that the works are in summer kept cool by the fact that the sun never penetrates within, whilst they are heated artificially in the winter.

The ideas of Garden Cities, remarks Mr. W. H. Allen, were not so pronounced in those days as they are now, and in order to find accommodation for the men the firm gave an order to a local builder to put up 400 houses of such a character as to come within the scope of working-men's income. They were relatively five, six, and seven shillings per week for six and seven roomed houses of the small villa fashion, each having a garden, although this is of a somewhat limited area. A temporary iron church was built, which it is hoped

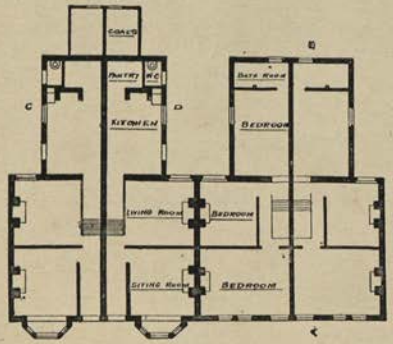
Offices of Messrs. W. H. Allen and Co., Ltd., Bedford.

ELEVATION



SECTION A B

SECTION C D



FOUR HOUSES IN QUEENS PARK

BEDFORD

Dwellings erected for the Workmen of Messrs. W. H. Allen and Co., Ltd., Bedford.

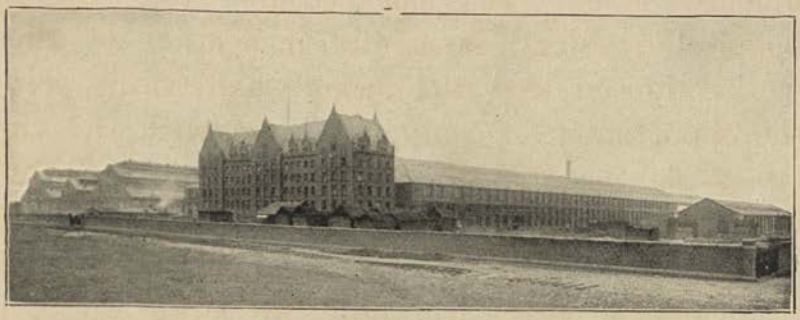
will one day be replaced by one of a more permanent character. New schools, to accommodate 600 children, have been erected, mainly through the exertions of Mr. W. H. Allen, in the neighbourhood, and quite a new district, known as Queen's Park, now numbering a population of some 5,000, has sprung up. The schools were designed by Messrs. Mallows and Grocock, of Mill Street, Bedford, and will be found described in another part of this chapter.

In the opinion of this firm, the advantages of leaving London are manifest from every point of view: the close quarters in which the men lived in the neighbourhood of the New Cut and the Marsh, in London, being exchanged for the neat, comfortable, and healthy residences I inspected, which are situated immediately adjoining the works at Bedford, together with the benefit to health experienced by the men, their wives, and their families, being sufficient argument in favour of removal from congested districts. Incidentally, it may be mentioned that the spirit of content and happiness of the men has been greatly enhanced; for York Street, Lambeth, is in unpleasant proximity to Stamford Street, wherein is to be found the headquarters of the 'Amalgamated Society,' who found the adjoining works convenient for the carrying out of labour experiments, culminating in conditions of interference almost intolerable, so

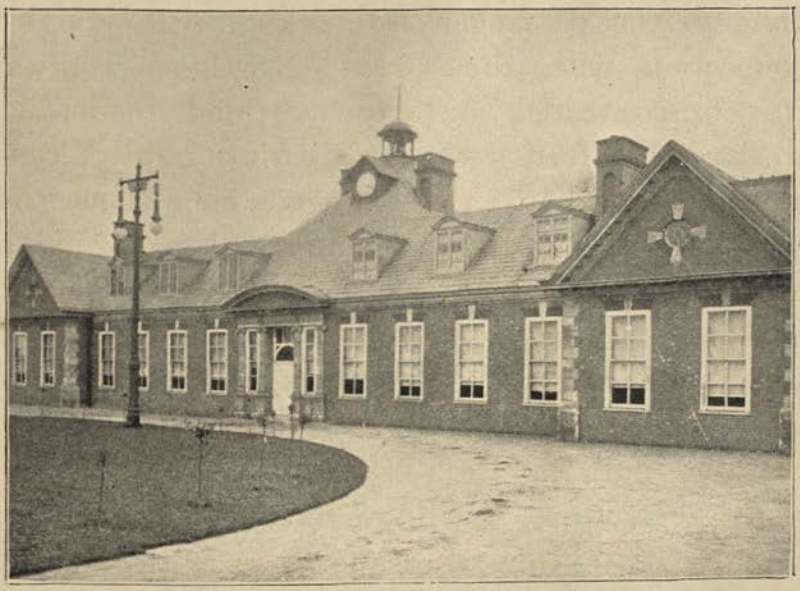
that upon resumption of work at Bedford non-unionist labour was had recourse to, with the happiest results. A careful inspection of these works showed that the owners had wisely seized the opportunity of equipping them with the very latest plant suited to the turning out of their high-class work.

Messrs. A. Ransome and Co., Ltd., who, during a number of years, had built up large works in Chelsea and Battersea, decided upon removing them into the country in 1901. After many sites had been visited, the *locale* chosen was Newark-on-Trent. There, upon the outskirts of the town, close to the passenger station and with sidings in connection with the Great Northern Railway, this firm erected an extensive and modernized works, and inform me they are thoroughly pleased and satisfied with the changed conditions they there experience from the removal. As in the case of those already mentioned, Messrs. Ransome have set their offices well back, and have laid out the space with a lawn planted with standard roses (see illustration) and a carriage sweep. Messrs. Simpson and Co., Ltd., of Pimlico, have also built works at Newark, but they have not enabled me to present anything in connection with them to the reader.

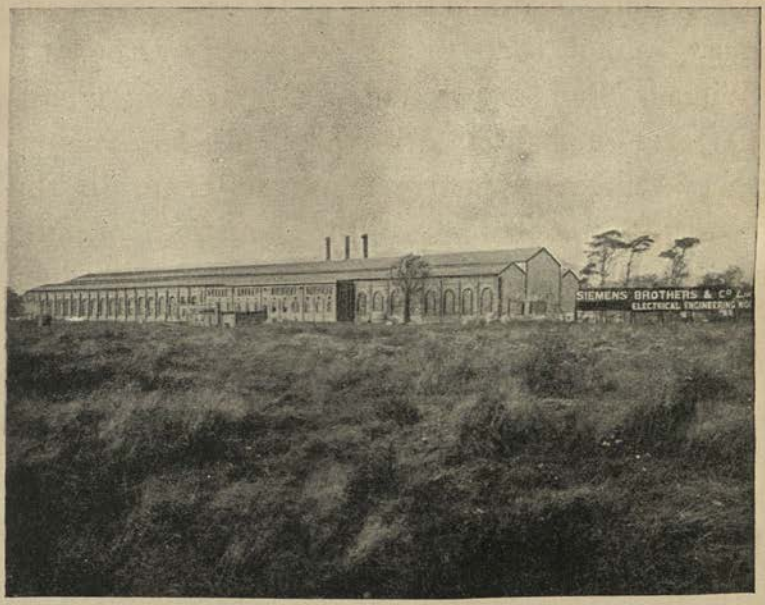
The large and well-known firm of telegraph engineers, electric-lighting contractors, and sub-

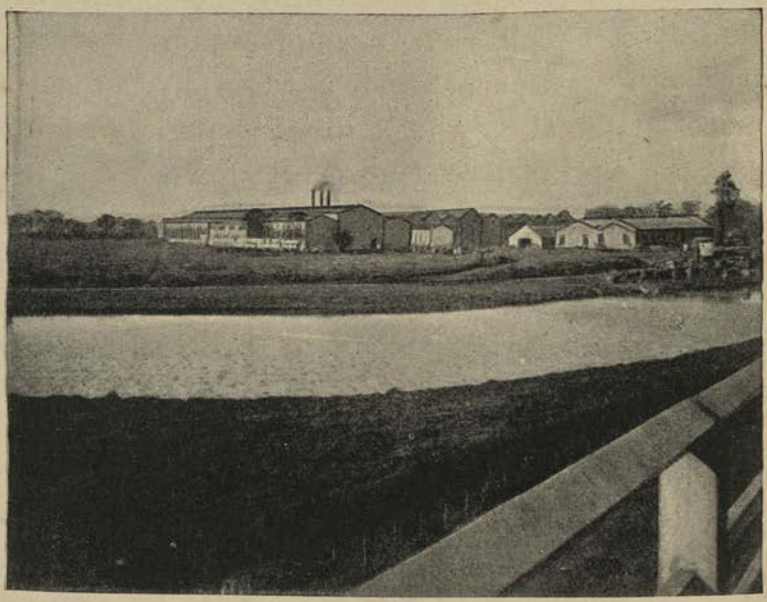


Offices, with Works at rear, of the British Westinghouse Co., Ltd., Trafford Park, Manchester.



Offices of Messrs. A. Ransome and Co. Ltd., Newark-on-Trent.





Messrs. Siemens Bros'. Electrical Works at Stafford.

ing in the foreground, is given, whilst a view of the main bay (there being five of such aisles) is given as a frontispiece to this section of the chapter. To go into technical details of design and construction would serve no useful purpose in this treatise; suffice it, then, to say that this one shop is 900 feet in length, 90 feet in span, and 100 feet in height. Hence, whilst being commodious and imposing, it is eminently light, cheerful, and healthy for the operatives. In the design of the offices also the health and comfort of the draughtsmen and clerical staff have been studied. These are contained in a handsome building six stories in height. The internal fitment is both hygienic and handsome, the floors, walls, and staircases being in white marble, embellished with polished brass. Each office is furnished with a novel 'combined wardrobe and lavatory cabinet,' whilst the heating and ventilation are carried out on the most modern principles by means of automatically-acting regulating devices. All the floors are approached by fast-moving lifts.

In all up-to-date works in our country American system and American ingenuity now begin to be *en évidence*. The British manufacturers, especially makers of engineers' 'machine tools,' have, unfortunately, relied far too long upon the laurels won some time ago. Their endeavours towards progress and the cheapening of production have, moreover, always met with vehement opposition from

Cottages in course of erection for Messrs. Siemens Bros'. Employés at Stafford.

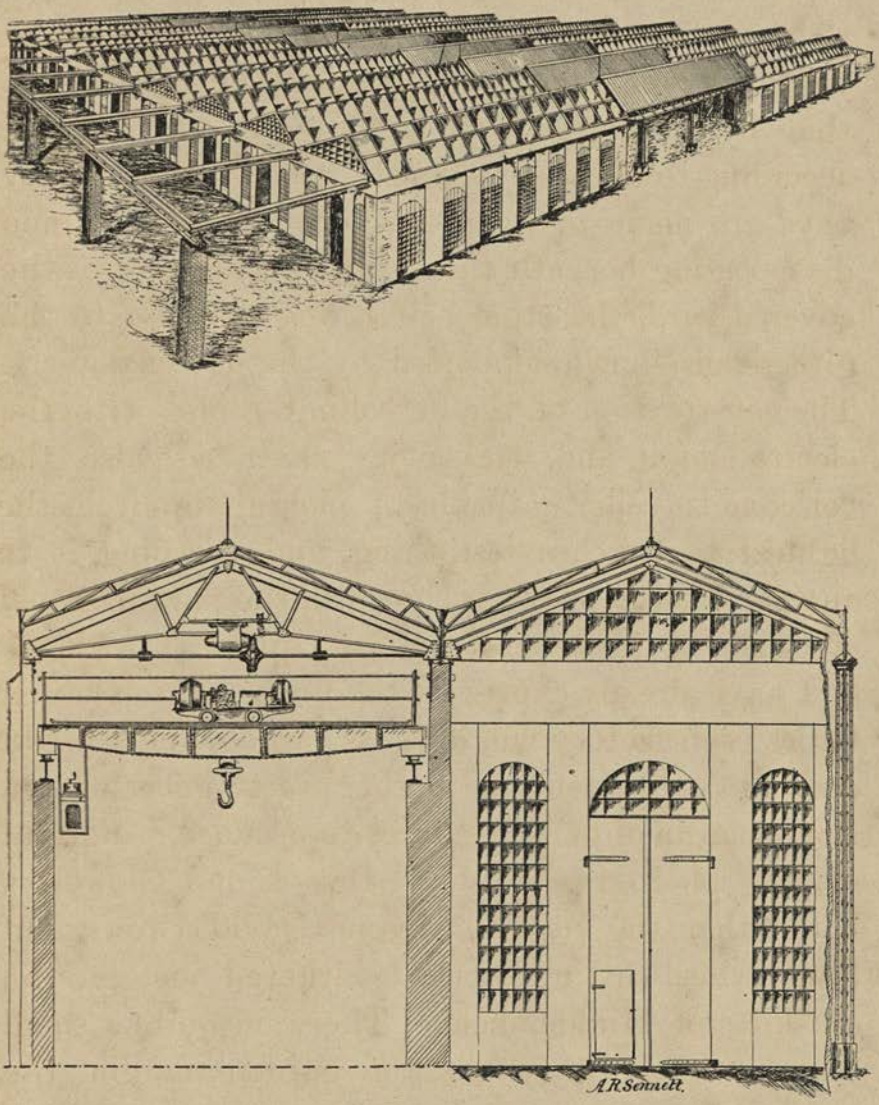
their trade-unionist workmen, with the unhappy result that not only were the orders, which might have been taken, executed abroad, but the very tools with which the British workman to-day works and the machinery with which engineering plant is now produced are to a surprising extent those made in America and Germany. Useful and valuable lessons might be learnt also from the Continent; indeed, a treatise, now that an awakening is taking place, would prove most valuable, written upon the building and equipment of manufactories throughout the world. Space forbids my even touching upon it, but in the illustrations are given types of factories characteristic of different countries.

In Garden Cities the price of land will permit of the ground-floor factory system of factory construction being adopted. This is the best for many reasons, among them being that it enables the workrooms to be lighted in the most efficient manner by daylight, permits of more perfect ventilation and more equable warming, whilst great facilities are offered for effective supervision. The modern factory consists, indeed, merely of one or more broad expanses of roof, carried upon walls and columns at a suitable height above the ground. The most perfect form of roof is that first, I believe, introduced in Yorkshire, and known as the 'weaving-shed' roof—viz., a 'span' roof, one side being at a gentle angle, the other almost vertical.

In one of the illustrations I have given the appearance of an almost ideal country factory, consisting of a number of bays covered by 'weaving-shed' roofs, and connected by a spacious *covered* loading-yard, the roofs being so designed and constructed that by turning a switch they run off and on, according to the weather. The roofs of the lengthy bays are made in two parts, one running off and disappearing beneath the slightly higher roof of the covered yard, the other half riding over on to the girder-rails shown supported by the external piers. The construction of these 'rolling roofs,' with the electro-motor and traversing shaft, as also the 'electric traveller,' capable of picking up from the lightest to the heaviest thing, and carrying it to any part of the works, is shown in the part-sectional end view of the type of factory I propose.

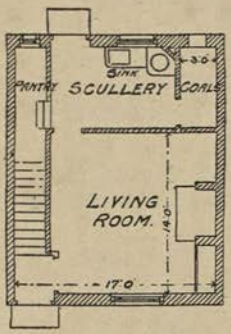
I have already expressed the hope that in Garden Cities each factory will have its garden, and I would desire to call attention to the pretty effect even a small margin of garden suffices to produce. Several of the photographs show this—none, however, better than the view of Messrs. David Brown and Sons' wheel-cutting works,* situated just on the outskirts of Huddersfield. There, in quite a small space, we see the works, the garden margin, the roadway, meadow with cattle grazing, the village church, and workmen's cottages. A plan of these

* Designed by Mr. J. Berry, architect, of Huddersfield.

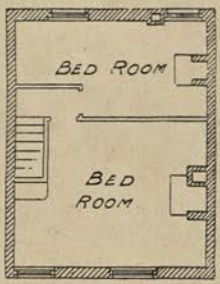


Design for Factory, with Electrically Removable Roofs (Sennett).

Effect of Gardens in a Yorkshire Manufacturing Town (Messrs. David Brown and Sons', Ltd., Wheel-cutting Works, Huddersfield).



GROUND FLOOR PLAN



CHAMBER PLAN

SCALE 8 FEET TO AN INCH

J. BERRY ARCHITECT
3 MARKET PLACE.
HUDDERSFIELD

Plan of Stone Cottages at Huddersfield.

latter is given, their cost in brick being £165, in stone £185, their rental being about 3s. 6d. per week. These dwellings comprise living-room, scullery, pantry, and two bedrooms, some having three bedrooms.

Due probably to the excellent examples set by the garden villages established in England, some amount of attention has been given to industrial dwellings upon the Continent. It is significant that this has been done in Switzerland in connection with the same industry as that which gave birth to Bourneville—namely, the manufacture of chocolate In connection with the large factory of Messrs. Russ Suchard et Cie., picturesquely placed—as we see it in the frontispiece to 'Village Dwellings,' the spot having been chosen for the purpose of utilizing the motive power of a mountain stream—on the shores of the Lake of Neuchâtel, a garden village has been built, known as Serrières. In this industrial village two principal types of dwellings were at first built. In each case each house constituted two complete dwellings, each dwelling consisting of four principal rooms—living-room, kitchen, and two bedrooms. A rather large proportion of the house is occupied by the staircases, which are said to be well lighted, whilst among the dependencies are a basement, serving as a workshop, an arched cellar, and a wood-shed, the staircase to the basement descending, as will be seen, from the porch. The second type of house—forming a double dwelling—has in

each tenement six principal rooms in addition to the dependencies mentioned. The workmen having expressed their desire for smaller tenements, in order to facilitate the task of furnishing them, as well as to reduce the amount of housewifery necessary, a third type of house was introduced containing five distinct tenements, two on each floor, with a fifth in the gable. In this case each tenement consisted of three rooms with a kitchen. Each tenement had its own latrine, the five being built in one, with the range of the five wood-sheds. The rent of the smaller tenements is 17 fr. 50 c. per month; of the larger, 18 fr. 50 c.

In connection with these, I must not forget to mention the ingenious mode resorted to in dealing with the vexed question of repairs. Out of the sums above mentioned, 2 fr. 50 c. and 3 fr. 50 c. are reserved respectively on account of repairs. The dwellings are inspected at certain intervals by the company's architect, and he decides what repairs are necessary, the cost of such repairs being debited against the tenant. Every three years the accounts are made up and adjusted, and the balance which has *not* been spent in repairs is returned to the tenant. The working of the system has been most salutary and satisfactory. I cannot, I think, do better than refer to it in the proprietors' own words: 'L'effet de cette mesure a été excellent: les ouvriers ont compris bien vite que leur intérêt était de prendre soin de leurs habitations, de les

maintenir dans un état de grande propreté et de faire de suite les petites réparations. Aussi l'entretien des maisons est-il parfait, à tel point qu'il a été possible de rembourser à plusieurs locataires la totalité de la somme mise en réserve et aux autres la moitié au moins de cette retenue.'

The diagram, plans, and elevations it is hoped will serve to explain the arrangement and construction of these dwellings. In regard to the cost of building, it is instructive to note that the economy obtainable by grouping is very marked. Although, as has been mentioned, the general type is that of double-tenement dwellings, yet, as also explained, the village has a number of five-tenement houses. Now, the cost of the five-tenement houses does not amount to even twice that of the two-tenement dwellings, as we learn from the following:

COST, EXCLUSIVE OF THE LAND.

Type No. 1, two tenements ...	...	Fr. 15,000, say	£600.
„ No. 2, two larger tenements	...	Fr. 17,000, „	£680.
„ No. 3, five tenements ...	...	Fr. 26,000, „	£1,040.

The fact that their workmen's dwellings were laid out in Garden Village fashion has come to be appreciated by the masters as well as the men, who have entered into and enjoyed the occupation with the zeal and enthusiasm of Bournvillites, Port Sunlighters, and Scottish allotment gardeners, as is evidenced by the subjoined passage from their reference to them: 'Les jardins, bien exposés au soleil, sont d'un grand rendement; leur influence

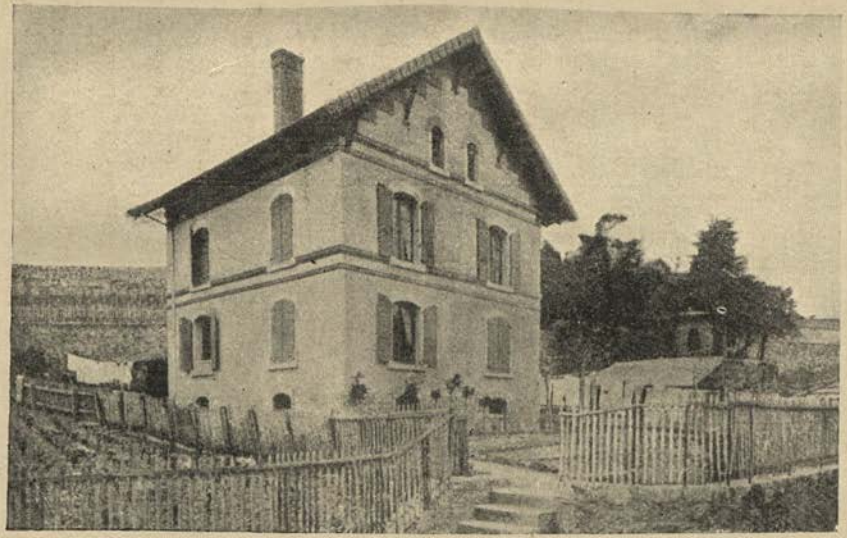
sur la vie de famille est excellente; les maris mettent tous leurs soins aux cultures afin d'obtenir les meilleurs légumes et les plus beaux fruits; les femmes et les enfants soignent les fleurs dont les plates-bandes sont ornées.'

The village is provided with some of the attributes of a Garden City, for it has a work-people's reading-room reserved four evenings a week for the men and three for the women, it being during the day-time used by both sexes. Just 'without the city' a large building has been provided, and is used as a *cuisine populaire* as well as assembly-rooms. There are also places for games and gymnastics reserved for the children of this *cité ouvrière.*

Industrial dwellings of other countries are illustrated, notably those of the United States; but in regard to all of these, it will be noted, neither the artistic treatment nor the cultivation of the home-like air so characteristic of our villages has been pushed to the extent it has with us.

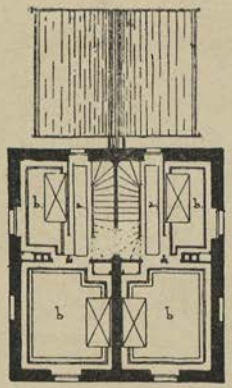
In regard to the Continent, perhaps the most interesting instance of the installation of a Garden City is to be found in Holland, carried out in connection with the works of the Netherlands Yeast and Spirit Company, Ltd. (founded about 1870), and the neighbouring factory of the Netherlands Oil Company, Ltd. (founded in 1883).

The foregoing brief reference to manufacturers who, in one branch of industry alone, have removed their works from London, will perhaps be sufficient



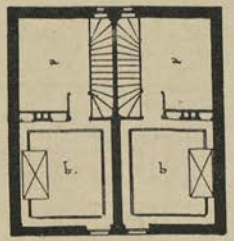
A Two-tenement Workman's Dwelling in the Garden Village of Serrières, Switzerland.

382 A



PLAN DU Ier ÉTAGE

a. Corridor
b. Chambre à coucher



PLAN DU COMBLE

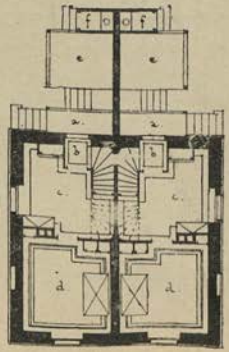
a Galetas
b Chambre haute

TYPE DE MAISON A DEUX LOGEMENTS

Échelle 1 : 200 Exposée à Paris en 1900 — Médaille d'or E. COLOMB, architecte.

PLAN DES CAVES

a. Cave
b. Corridor
c. Atelier



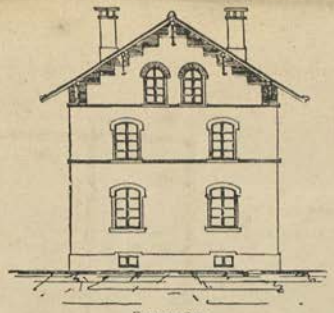
PLAN DU REZ-DE-CHAUSSÉE

a. Perron
b. Entrée
c. Cuisine
d. Chambre de ménage
e. Bucher
f. Latrines

TYPE DE MAISON A DEUX LOGEMENTS

N° 1

Échelle 1 : 200 Exposée à Paris en 1900. — Médaille d'or. E. COLOMB, architecte.



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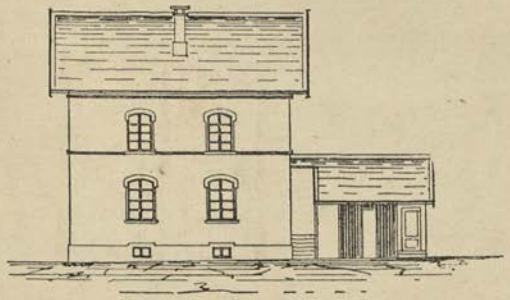


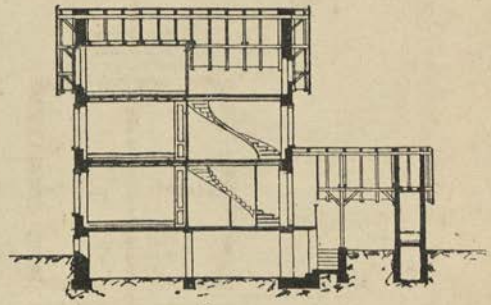
FAÇADE EST

TYPE DE MAISON A DEUX LOGEMENTS

N° 1

Échelle 1 : 200 — Exposée à Paris en 1900 — Médaille d'or. — E. COLOMB architecte.

FAÇADE NORD



COUPE EN LONG

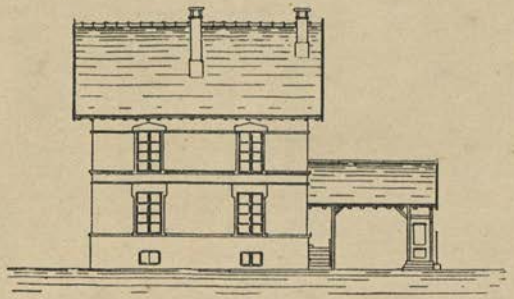
TYPE DE MAISON A DEUX LOGEMENTS

N° 1

Échelle 1 : 200 — Exposée à Paris en 1900. — Médaille d'or. — E. COLOMB, architecte.

382 C

Details of Workmen's Dwellings at Serrières.



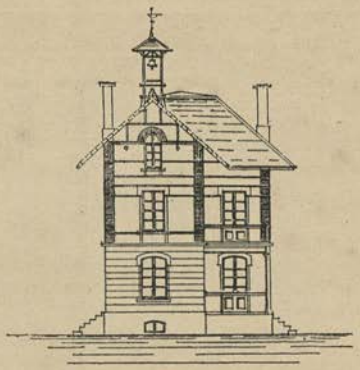
FAÇADE LATÉRALE

TYPE DE MAISON A DEUX GRANDS LOGEMENTS

N° 11

Échelle 1 : 200

W. MAYOR, architecte.



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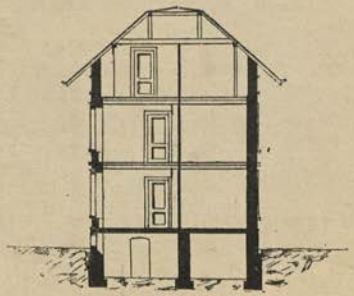


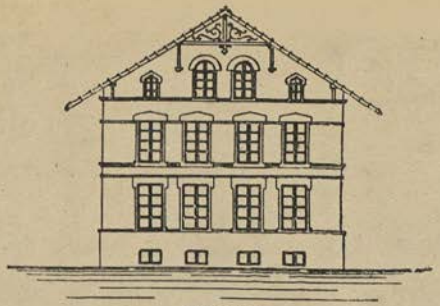
COUPE EN TRAVERS

TYPE DE MAISON DE CONTREMAITRE

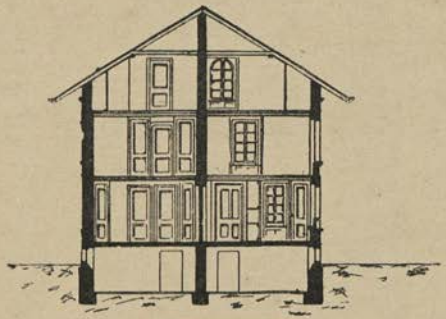
Echelle 1 . 200

W. MAYOR, architecte.

Details of Workmen's Dwellings at Serrières.



FAÇADE SUD



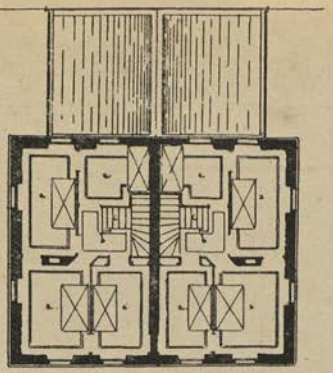
COUPE EN TRAVERS

TYPE DE MAISON A DEUX GRANDS LOGEMENTS

N° II

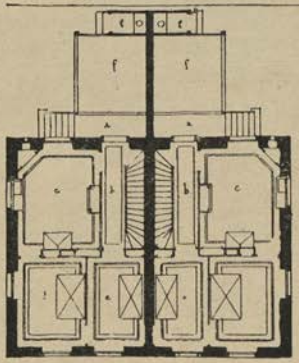
Échelle 1 : 200

W. MAYOR, architecte.



PLAN DU 1er ÉTAGE

a Chambre à coucher
b Palier
c Escaliers



PLAN DU REZ-DE-CHAUSSÉE

a Entrée
b Corridor
c Cuisine
d Chambre de ménage
e Chambre à coucher
f Bucher
g Latrines

TYPE DE MAISON A DEUX GRANDS LOGEMENTS

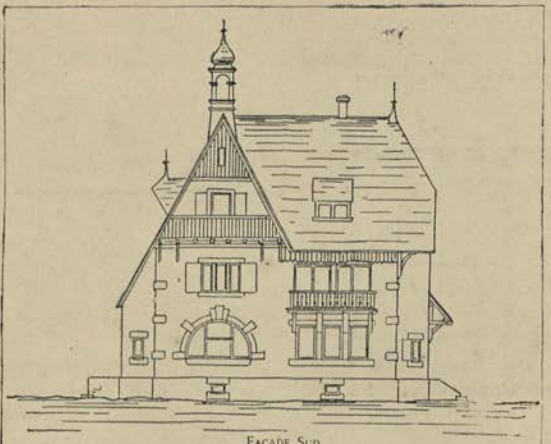
N° II

Échelle 1 : 200

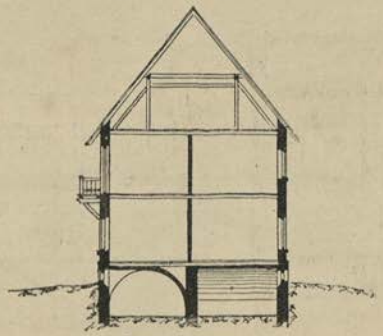
W MAYOR, architecte.

382 E

Details of Workmen's Dwellings at Serrières.



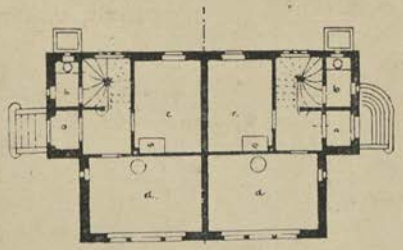
FAÇADE SUD



COUPE EN TRAVERS

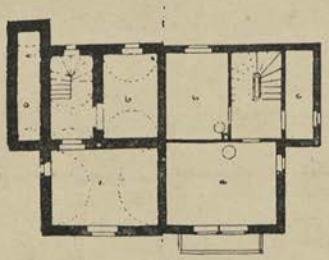
TYPE DE MAISON A DEUX LOGEMENTS

Echelle 1 : 200. Jo. WOLF, architecte.



PLAN DU REZ-DE-CHAUSSE

a. Entrée
b. Latrines
c. Cuisine
d Chambre de ménage



PLAN DES CAVES

CAVES

a fosse d'aisances
b. Cave
c. Remise-atelier

PLAN DU 1er ETAGE

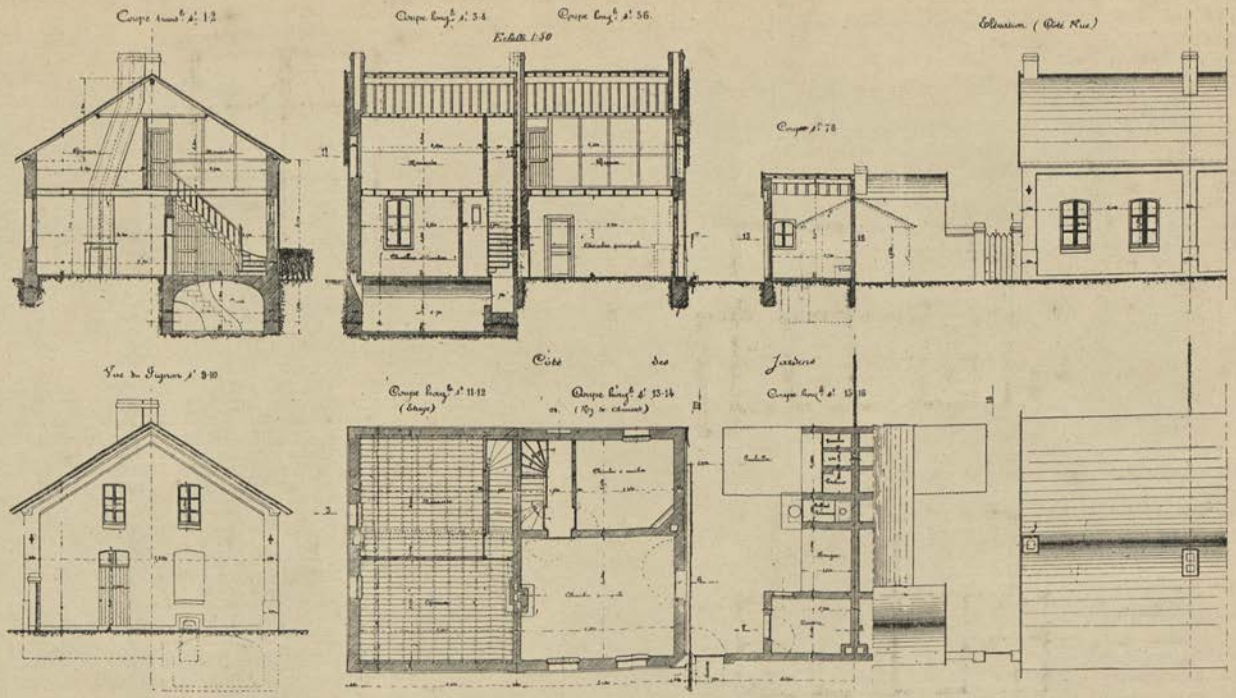
1er ETAGE

a. Chambre à coucher
b. Chambre à coucher
c réduit

TYPE DE MAISON A DEUX LOGEMENTS

Echelle 1 : 200 Jo. WOLF, architecte.

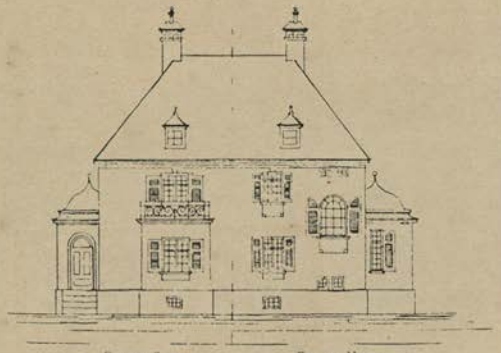
Details of Workmen's Dwellings at Serrières.



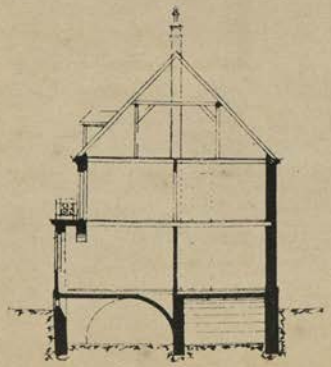
Details of Workmen's Dwellings at Serrières.

382 G

BLUDENZ



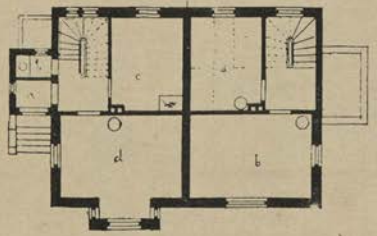
FAÇADE SUD FAÇADE NORD



COUPE EN TRAVERS

TYPE DE MAISON A DEUX LOGEMENTS

Echelle 1 : 200. Ig. Wolf, architecte



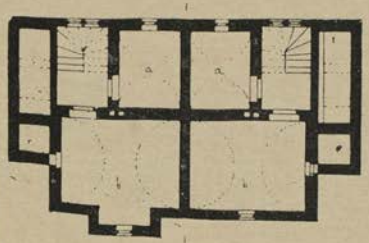
PLAN
DU REZ-DE-CHAUSSÉE

a. Entrée
b. Latrines
c. Cuisine
d. Chambre de ménage

PLAN DU Ier ÉTAGE

a. Chambre à coucher
b. Chambre à coucher.

PLAN
DU REZ-DE-CHAUSSÉE DU Ier ÉTAGE



PLAN DES CAVES

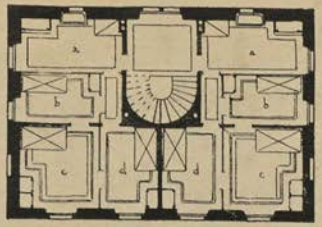
a. Cave
b. Atelier

PLAN DES CAVES

TYPE DE MAISON A DEUX LOGEMENTS

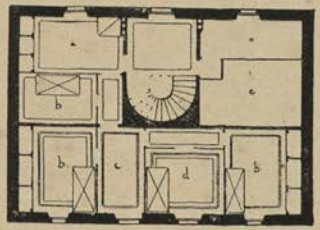
Échelle 1 : 200. Ig. Wolf, architecte.

Façade and Section of a German Industrial Dwelling.



PLAN DU Ier ÉTAGE

a. Cuisine
b Chambre à coucher
c Chambre de ménage
d Chambre à coucher



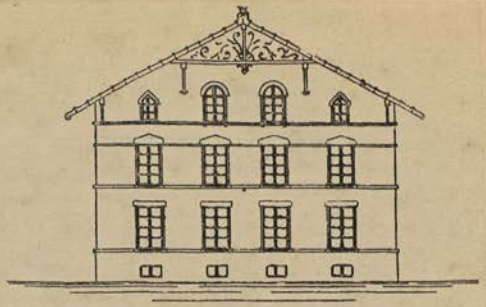
PLAN DU IIme ÉTAGE

a Cuisine
b Chambre à coucher
c Chambre à coucher
d Chambre de ménage
e Mansarde

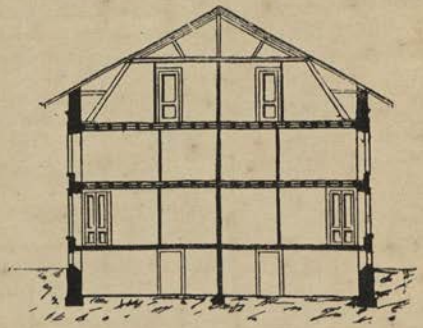
TYPE DE MAISON A CINQ LOGEMENTS

N° III

Échelle 1 : 200 — E. COLOMB architecte.



FAÇADE SUD



COUPE EN TRAVERS

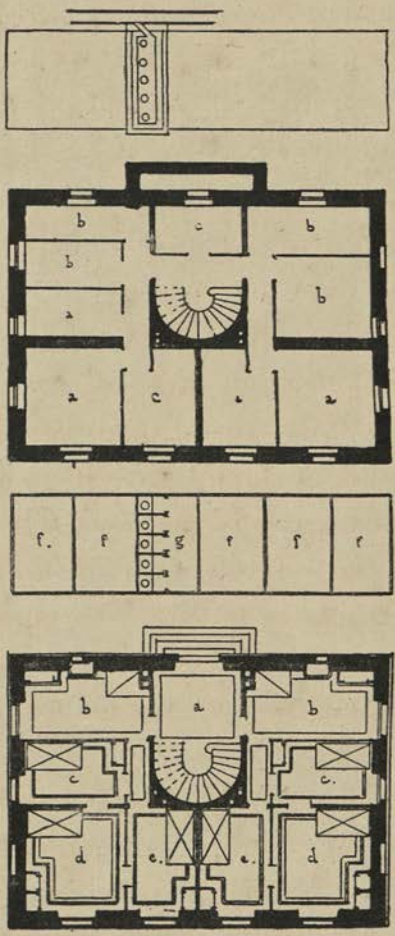
TYPE DE MAISON A CINQ LOGEMENTS

N° III

Échelle 1 : 200 — E. COLOMB, architecte.

384 A

Details of Workmen's Dwellings at Serrières.



Details of Workmen's Dwellings at Serrières.

to show that the desirable exodus has already had its commencement. It will be observed, however, that such exodus has been confined to *large* works. This is easily explicable, and the fact at once points to a great necessity—that of organized and systematic provision for facilitating the removal of *smaller* works. An instant's reflection will show that it is only the larger firms—those with the command of considerable capital—who *can* thus migrate. For although the cheapness of land, reduced rates, and certain other factors, are in favour of decentralization, yet there are certain heavy incidental expenses to be faced which go far towards neutralizing the advantages in cases where the manufacturers themselves have *everything to provide*. For example, railway sidings to many trades are productive of material economy; but these are exceedingly expensive conveniences to construct, and obviously to provide such for *individual* works is a wasteful expenditure of capital —expenditure which could far more conveniently and favourably be entered upon in combination with *several* factories. Again, country land, to suit it for industrial use, demands considerable expenditure upon it in regard to drainage and means of access. Here, again, is entailed much unnecessary outlay, and such as can be far more economically effected in regard to an assemblage of concerns. Expenditure upon motive-power

plant, upon the supply of water, upon lighting plant, and upon other *necessaries*, is also uselessly and abnormally heavy if it be incumbent to carry it out in each individual instance. Such matters also as the supply of occasional labour—of labour in branches outside of the specific trade—the distance operatives may have to journey from the nearest town, the want of shops to fulfil their requirements, to say nothing of the housing of the workpeople employed in the particular factory, all combine to form an aggregate of circumstances rendering it impossible for works of small size and firms of moderate capital strength to participate in the exodus at the present moment. Such and other considerations have brought about the formulation of schemes for overcoming the difficulties. Of these there is none so well calculated to meet the exigencies of the case and to solve the problem both efficiently and economically as the one about to be entered upon—the establishment of a Garden City within easy reach of the Metropolis.

To exemplify the prevailing difficulties, I will touch upon but one point—the very important one of the housing of the operatives and their families. It has been thoughtlessly suggested that the proper persons to provide housing accommodation are the owners of the works intended to be established. How erroneous this view is a moment's reflection will serve to show, for, if a manufacturer

desires to move his works, it usually happens that the motive is their enlargement. Manufacturers, especially those of moderate capital, desire to *be* manufacturers; it is only those who—after many years of trading having become possessed of surplus capital—can *profitably*, at the same time, become landlords. Under ordinary circumstances, almost the whole of a manufacturer's capital is 'locked up' in his plant and machinery, or these combined with the buildings of his works. The fallacy of the proposal will perhaps be most clearly brought to the mind of the reader by means of a simple calculation. Let us assume that a manufacturing firm about to remove their works into the country has an available capital of, say, £50,000. Now, they are prepared to risk the whole of this capital, and to incur the wear and tear and anxiety of carrying on a business, on the assumption that they will thereby obtain a return for their capital expenditure and their energy combined of, let us say, 15 per cent. The carrying on of the works should, therefore, bring in an income of £7,500.

Now, works in which some £50,000 have been spent in plant and machinery should be capable of employing from 500 to 1,000 hands, according to the intrinsic value of the plant and machinery necessary for the carrying on of the specific trade. Let us take the mean of 750 men. Were the firm called upon to furnish a cottage for each, the

capital expenditure at the least computation would be £187,500, exclusive of the value of the land upon which such cottages would have to be built. In other words, the housing of their men would cost the firm more than three times their total capital.

Examples dealing with works of other magnitudes might be taken, but they would only emphasize the fallacious idea I have referred to. Let us assume, for example, that the capital expenditure on dwellings did not exceed that upon works, plant, and machinery ; also assuming, for the sake of argument, that the owners of such works *had* the requisite capital, let us look at the effect it would have upon their earnings. Taking the capital already mentioned, the income, as has been stated above, would have been £7,500 ; but if only half this amount—which is inadequate—should have to be spent upon cottages, then it is obvious that the income would become reduced to £4,750, or little more than half. (This is assuming the investment in industrial dwellings to return 4 per cent. upon the capital expenditure.)

But the point I desire to direct the reader's attention to is this—whereas there are *millions of pounds* available for investment from the private resources of the general public, a community who would only be too glad to obtain 4 per cent. from a safe investment, there is not 1 per cent. of the

works throughout the country—when in full work—which has any surplus capital worth mentioning to invest in house property. Why, I ask, should the manufacturers—the life-blood of the proposed City—indeed, of the nation—be called upon to sacrifice a very large proportion of their incomes—incomes obtained by anxiety and incessant toil—obtaining only as a return a percentage approximating to that obtained by those who prefer leading an idle life? Or, to put it otherwise, why should the hard-working manufacturer, in the unnecessary sacrifice of his income, deprive the widows of his compeers from deriving their income from a safe and stable source, in which he has neither the time, inclination, nor desire to dabble?

I trust I have said sufficient to expose this fallacy, but in doing so I do not wish it to be inferred I imply that Garden. City authorities should become landlords to the enormous extent this would involve, although this would be a very good and wholesome plan. This is unnecessary, because there are other apposite and proper ways and means of providing dwelling accommodation required by manufacturers for their operatives.

If, however, one stops to analyze the matter, one will see that it comes to very much the same thing, whether money be advanced to builders in the ordinary way, or whether that same amount of capital be invested in a Garden City Company and

used for the same purpose. A moment's reflection will show, however, that the latter alternative would be the most efficient and would produce the best return, because, in all such matters, the larger the scale upon which such operations are carried out, the cheaper can the entities—in this case workmen's dwellings—be produced.

The above remarks will also, I trust, serve to show, given a site *à propos* to an industrial zone, the necessary sewerage and supplies of water, gas, and electricity, that the difficulties of the housing question not only at once disappear, but that the manufacturers are put into a position to obtain their works at less capital expenditure, not only in regard to buildings, but also to the installation of much of their plant, notably their motive-power plant. In addition, the annual cost of running their works would experience a most remarkable diminution. There are many reasons for this, all too technical and intricate to be here touched upon. I need only cite the well-known fact that the cost of motive power varies in a most surprising degree in inverse ratio with the size of the plant employed. This will be again exemplified in regard to the first Garden City, in which, from the commencement, it is proposed to employ cheap gas for motive power by that system in which a valuable by-product is obtained. More concerning this and other technical details, however, will be found in Chapter IX.

Exterior of a Workman's Dwelling, Van Marken Garden Village.

Interior of a Workman's Dwelling, Van Marken Garden Village.

Returning to the Continent, we find the interest of the Van Marken industrial city referred to centres largely in the sociology involved, the systems of profit-sharing and co-operation being worked out with much elaboration. Especially is this the case in relation to the 'Van Marken Press,' the operatives of which have the right of redeeming the whole of the original capital. Such matters, however, are more suited to discussion in treatises upon social economics. Space here prohibits anything beyond a brief reference to the industrial dwellings. These, of which illustrations are given, were erected upon the co-operative principle, and are held collectively, individual ownership being prohibited. After serious study, we are told, it was decided they should be erected upon 'the system of little groups (English cottage style),' these being preferred to the so-called barracks—block-dwellings. The right of common user of main entries, landings, staircases, courts, etc., was thought to be objectionable; whilst, on the other hand, were credited to the 'system of small groups,' (*a*) greater personal liberty for each family, (*b*) greater cleanliness, and (*c*) fewer subjects for disputes between neighbours; it was, however, appreciated that greater expense in construction had to be debited as a disadvantage against the *quasi* industrial-dwelling system.

Disadvantage and trouble arising from individual artizan ownership was foreseen from the first and

provided against, the following being set out as 'some of the advantages of collective proprietorship': The possibility of a constant watch on the upkeep of the houses, which prevents their being neglected to the prejudice of the neighbours. Collective proprietorship also hinders arbitrary changes and the spoiling in form of the dwellings. Reciprocal surveillance, preventing the ruin of the house. Mutual agreements on all that may be done with regard to the houses in the interest of the inhabitants. Above all, the great moral advantage —development of solidarity.

The 'repair trouble,' however, was not so clearly foreseen, nor its serious results appreciated, subsequent experience showing the item of repairs to have the effect of producing a debit instead of a credit balance-sheet. 'The disadvantageous figures' —says Mr. van Marken—'are due in great part to the want of solidarity of a certain number of inhabitants who sometimes ruin the interior of the houses in order that they may then exact from the company repairs that have become necessary. However, progress can already be reported for a considerable time past, for among the tenants is found a large group of good elements upon whom the continuous efforts made to foster the feeling of solidarity have not failed to exercise a visibly happy influence.'

The reader will observe that I refer to four distinct modes of dealing with this vexed question

Façade.

End View.

Upper Floor Plan.

Transverse Section.

Longitudinal Section.

Ground Plan.

WORKMEN'S DWELLINGS, AGNETA PARK, HOLLAND.

Price, Type A.

Ground (with gardens), 400 M² à 5 fl. 40 c.	1,360 florins.
Building of 4 dwellings	5,000 „
Total	6,360 florins.

Price of each dwelling, 1,590 fl. = £132 10s.
Rent per week, 2 fl. = 3s. 4d.

0 1 2 3 4 5 Metres.

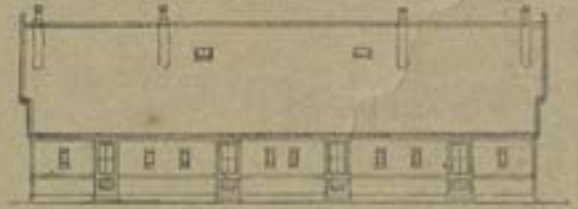
(1 yard = 0·914 Metres.)

a, Entry.
b, Living room.
c, Kitchen.
d, Closet.
e, Recess.
f, Cupboard.
g, Bedroom.
h, Granary.
i, Staircase, Cellar.

Façade of Grouped Dwellings.

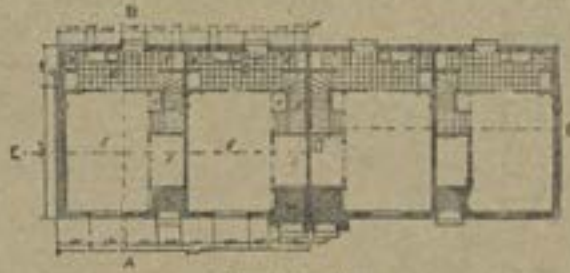
End View.

End Section.

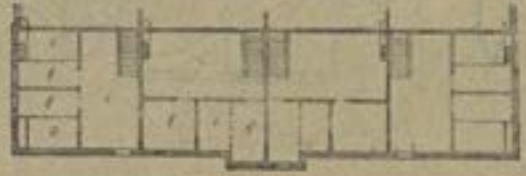


Back Elevation.

Section on C D E.



Ground Floor Plan.



Upper Floor Plan.

WORKMEN'S DWELLINGS, AGNETA PARK, HOLLAND.

Park, Type B.

Ground (with gardens), 400 M² à 3 fl. 40 =	1,360 florins.
Building of 4 dwellings	6,000 "
Total	7,360 florins.

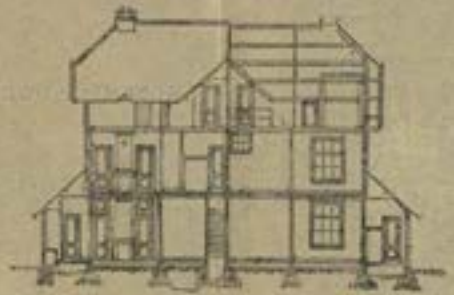
Price of each dwelling, 1,840 fl. = £153 6s. 8d.
Rent per week, 1 fl. 90 = 3s. 2d.

0 1 2 3 4 5 Mètres.

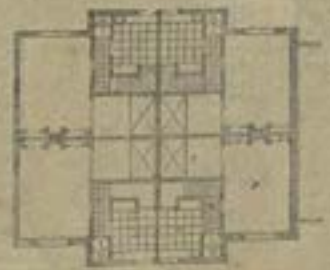
(1 yard = 0·914 Mètres.)

a, Entry.
b, Living-room
c, Kitchen.
d, Recess.
e, Cupboard.
f, Closet.
g, Staircase. Cellar.
h, Bedroom.
i, Granary.

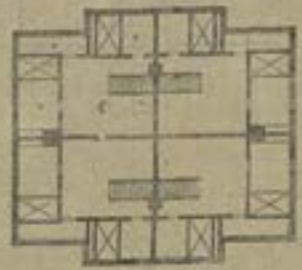
Façade.



Section on A B.



First Floor.



Upper Floor.

WORKMEN'S DWELLINGS, AGNETA PARK, HOLLAND.

Price, Type C.

Ground, 400 M² à 3 fl. 40 =	1,360 florins.
Building of 8 dwellings	12,000 „
Total	13,360 florins.

Price of each dwelling, 1,670 fl. = £139 3s. 4d.
Rent per week, 3 fl. 50 = 5s. 10d.

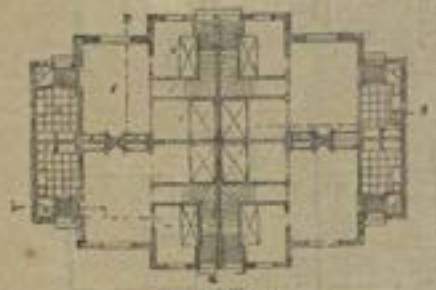
a, Entry.
b, Living room.
c, Kitchen.
d, Room.
e, Bedroom.

0 1 2 3 4 5 Mètres.
(1 yard = 0·914 Mètres.)

f, Cellar.
g, Cupboard.
h, Granary.
i, Box-room.

Side Elevation.

Section on C D.



Ground Floor.

Façade.

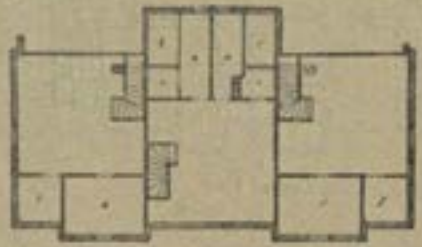
End View.

Section on A B.

Back Elevation.

Section on C D E.

Ground Floor Plan.



Upper Floor Plan.

WORKMEN'S DWELLINGS, AGNETA PARK, HOLLAND.

PRICE, TYPE D.

Ground (with gardens), 300 M² à 3 fl. 40 -	1,020 florins.
Building of 8 dwellings	5,780 "
Total -	6,800 florins.

Price of each dwelling, 2,270 fl. = £189 5s. 4d.
Rent per week, 2 fl. 80 = 4s. 8d.

0 1 2 3 4 5 Mètres.

(1 yard = 0·914 Mètres.)

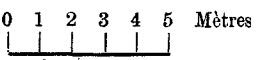
a, Entry.
b, Living-room.
c, Drawing-room.
d, Bedroom.
e, Kitchen.
f, Box-room.
g, Recess.
h, Closet.
i, Cupboard.
k, Staircase, Cellar.

WORKMEN'S DWELLINGS, AGNETA PARK, HOLLAND.

Price, Type D.

nd (with gardens), 300 M² à 3 fl. 40=	1,020 florins.
ling of 3 dwellings	5,780 „
Total	6,800 florins.

Price of each dwelling, 2,270 fl. = £189 3s. 4d.
Rent per week, 2 fl. 80 = 4s. 8d.



(1 yard = 0·914 Mètres.)

a, Entry.
b, Living-room.
c, Drawing-room.
d, Bedroom.
e, Kitchen.
f, Box-room.
g, Recess.
h, Closet.
i, Cupboard.
k, Staircase, Cellar.

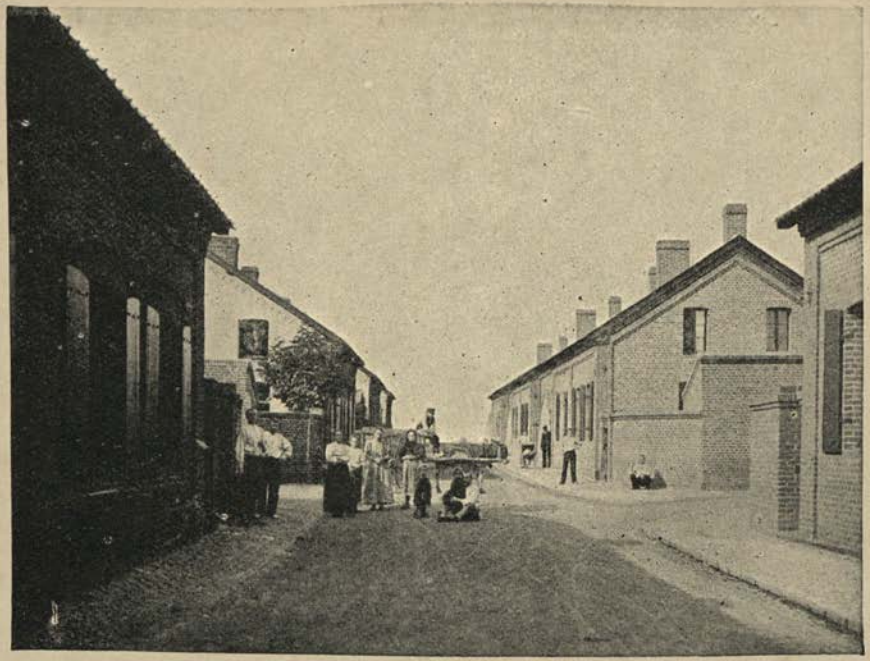
of repairs: (*a*) The Port Sunlight system of collective payment for repairs, which, prior to its introduction, had a disastrous effect in forcing up the rentals; (*b*) the 'Ealing' system, in which the division of surplus profit influences the cost of repairs; (*c*) the system to which we now refer, similar in its nature to (*b*); lastly, the Swiss system —viz., the refunding of the unexhausted percentage set apart in respect of repairs. Very casual thought will, I think, suffice to show that of these four systems the last is by far the superior, because in this the reward reaped by the well-behaving is absolutely uninfluenced by collective inconsideration in regard to repair expenditure.

By the courtesy of Mr. van Marken I am enabled to present to the reader drawings of the types of dwellings constituting this interesting industrial village; and there being a scale and description appended to each, further explanation is, I feel, unnecessary.

To take one further continental example, I cannot do better than refer briefly to the dwellings forming part and parcel of that great industrial centre which has sprung up as the outcome of skilfully directed and incessant energy on the part of the brothers Krupp. The industrial village at Essen is characterized by the want of uniformity in type of the industrial dwellings, for these range through the whole gamut, commencing at the bungalow and terminating at the multiple story

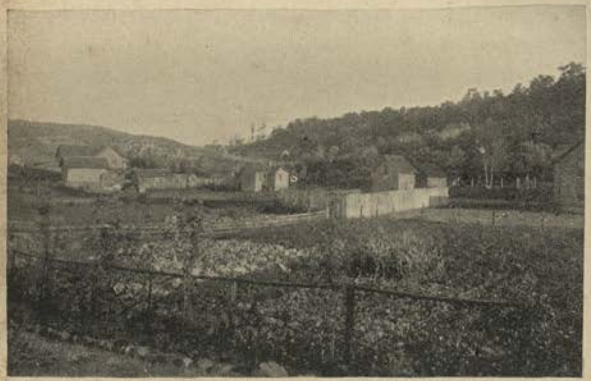
block dwellings. Here, again, by the courtesy of Herren Krupp, I am enabled to reproduce plans and elevations of the dwellings with scales appended, from which the reader will be able to obtain an excellent idea of the types of operative dwellings in this extensive ultra-urban industrial centre. The growth of the colossal works, progenitors of the village, and the vicissitudes through which they have passed having been frequently referred to, I need not dwell upon them. All well remember that by energy and perseverance the workman became the millionaire, and in this connection we find—now in the very heart of the vast agglomeration of factories—a thing of industrially historic interest, namely, the modest and homely bungalow, erstwhile the dwelling of the founder—left *in statu quo* as a prepollent reminder of the enormous value of individual effort.

In regard to France, one is unable to chronicle any progress in regard to our subject. A move, however, has now been made by the formation of a bureau instituted for the study of the problem, which has already had the effect of directing the attention of large employers of labour to it. Amongst those interested in the movement is Mons. Casimir-Perier, who is inaugurating a change in regard to the housing of the numerous operatives of his extensive collieries. It is by no means strange that progress should be unsatisfactory when one considers the character of the French, in that



A Street in the Mining Village of Thiers, France, with Modern Dwellings built at the instigation of Mons. Casimir-Périer. Rental, 7 francs a month.

394 A



Views in the Garden Village of the Cleveland Cliffs Iron Co., U.S.A. Operatives' Dwellings, to which first-class awards were made for best kept Premises.

(The lower view on the left shows the allotment gardens.)

A Foreman's Dwelling in the Mining Village of Thiers, France.

their dwellings are looked upon merely as their sleeping quarters, all meals in almost all grades, as well as all recreations, being partaken of in *café* and restaurant. It is, however, strange in a land where the artistic taste is more developed than with us to find workmen's dwellings so exceedingly ugly, and no attempt being made to produce anything in the nature of Garden Cities.

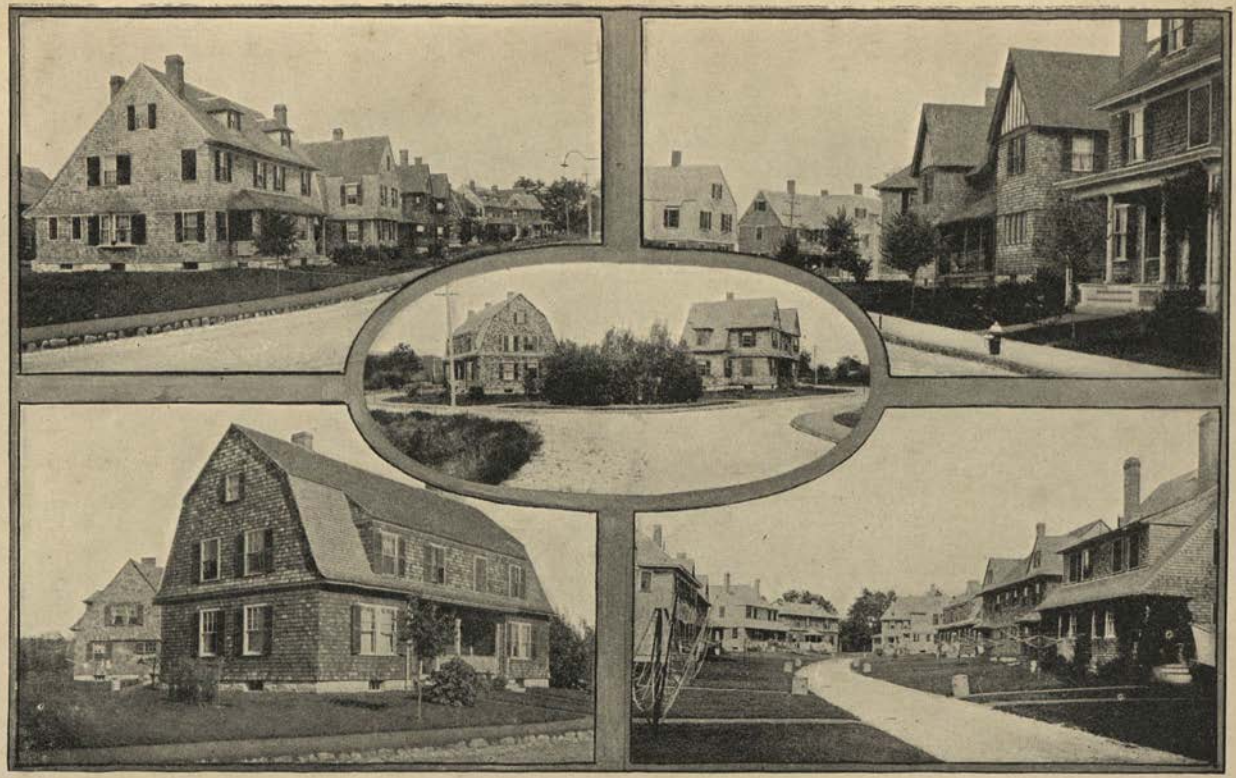
So much, then, in regard to Garden Cities upon the Continent. If we turn to the United States, we shall there again find that what has been done in connection with our subject has also been wholly the outcome of individual effort, there being no parallel to a Garden City established by means of public subscription, such as is about to be realized with us. A careful study of American industrial communities would serve to show that their characteristic lies in the more perfect *system*—a valuable and very pronounced trait in the character of the 'younger world,' we here would do well to emulate. Considerations in this relation, obviously, range themselves upon the sociological side, and therefore do not fall within the domain of this chapter, and, indeed, very little within that of the general public, such matters lying wholly within the province of the employers, who, however, might well devote their spare time to making acquaintance with recent developments in American industrial modes and manners.

Just as a valuable treatise might well be written

upon American labour-saving systems, so might a valuable book be written upon American socio-industrial arrangements. And in this connection I should not omit to mention that within the last twelve months a movement similar to our own has been set on foot under the auspices of an association formed for that purpose, and carried on under the style of the 'American Bureau of Sociology.' By the courteous co-operation of the director, Dr. W. H. Tolman, much interesting information has reached me, together with numerous photographs, some of which I have the pleasure of reproducing. The conditions, however, differing so widely from those obtaining with us, detailed descriptions would not, I am persuaded, be of any great value.* A glance at some of the illustrations would serve to show this, for we there see dwellings built of wood used both externally and internally, and in a manner entirely repugnant to the urban laws of our own country. I will therefore confine myself to a few words concerning one town only.

The first instance of a revolutionary change being entered upon in regard to the housing of the

* For the benefit of those who may desire to study the question as concerning the United States, it may be as well for me to mention the fact that President Roosevelt, when Governor of New York State, in 1900, appointed a Commission to inquire into and report upon the tenement-house problem, and the result of the investigations is now being embodied in a work shortly to be issued, of which Mr. R. de Forest and Mr. L. Veiller are joint editors.



Timber Dwellings in an American Garden Village.

The upper views are fronts, the lower backs, hidden from view by the bushes seen in the central picture.

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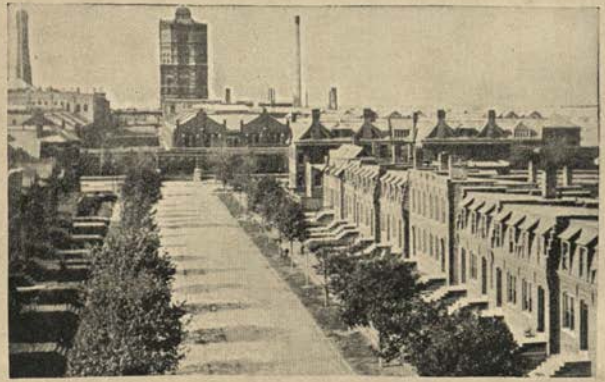
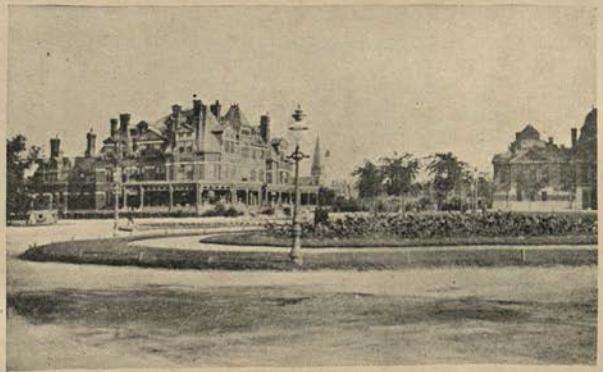




Views in the Garden City of Pullman, U.S.A.

Public Gardens and Church.
A typical Operatives' Avenue.

Public Gardens and Hotel.
The Central Circus and Hotel.

396 B

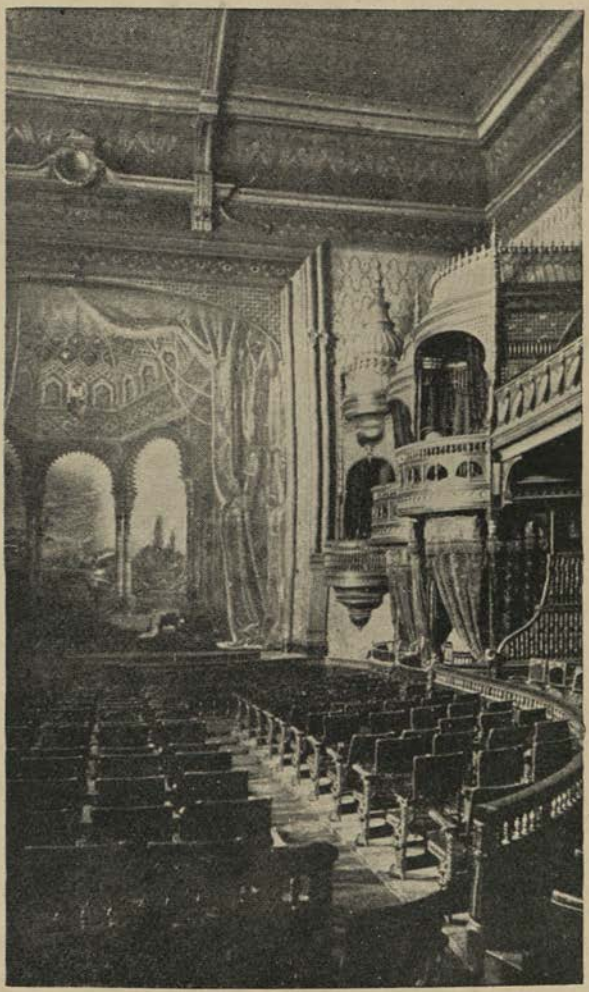
operatives appears to have been in 1879 in connection with the massing together of several large engineering works which had theretofore been carried on in different cities—namely at St. Louis, Detroit, Elmira, and Wilmington—for the production of that type of railway rolling-stock with which we have only quite recently become acquainted in our own country under the style of the 'Pullman Car.'

In 'starting out'—as our American cousins would say—to carry into effect the desired centralization of his factories, Mr. Pullman found himself in precisely the same happy position as our first Garden Company finds itself to-day. For although Chicago is the railway centre of the States, and hence presented itself as a fitting *locale* for his establishment Mr. Pullman felt he could do a greater thing than to add yet another great factory to an already overcrowded city by keeping it outside, at a convenient distance from the great focus of railway connections. Hence he fixed upon the shores of Lake Calumet some fourteen miles beyond the confines of Chicago. He felt, moreover, he would be doing a greater thing than the building of a great factory if he laid the foundations of a healthy and well-organized industrial community, his intentions being precisely similar to those of our pioneer company, and he commenced in a very similar fashion—by the purchase of a tract of land some 3,500 acres in extent.

In calling attention to this analogy, I would beg to be allowed also to direct the reader's attention to

the similarity of the views of this great pioneer in industry with those I have ventured to suggest in the introduction to this volume. Mr. Pullman based his arguments upon the business theory that 'the better the man, the more valuable he is to himself; and just in that proportion is he better and more valuable to his employer.' On this simple business axiom he commenced the attempt to surround the working-man with such influences as would most tend to bring out the highest and best there was within him. So far from starting upon the thesis that working-men are weaklings to whom things should be given, and who must be held up and supported lest they fall, his starting-point was exactly in the opposite direction. The assumption he made was that the workers in his community would be representative of the best type of American workmen—men who stood solidly and firmly upon their own feet; men who, as he argued, 'would work out valuable and well-rounded lives just in proportion to their opportunities.' His prognostications were, as we know, not belied, for he has proved that by the investment of a large capital it is possible not only to give workmen better conditions than those obtaining in ordinary, but that these conditions may be afforded at prices wholly within their power to pay, yet sufficient to return moderate interest on such investment, and thus to sustain it and make it enduring. With philanthropy of the abstract, sentimental sort, his scheme had nothing to do.

Water Tower and Power Station, Pullman City.



Interior of the Theatre, Pullman City.

'With the philanthropy which helps men to help themselves, without either undermining their self-respect or in the remotest degree touching their independence or absolute personal liberty—with philanthropy of *this* type it has had everything to do.' That, we are told, 'is the whole Pullman proposition in a nutshell.' That, in a nutshell, I would desire to add, is the modus wherein, with us, absolute success assuredly lies.

Pullman's idea, then, was primarily *to elevate*. The first step in this direction, to his mind, was to elevate the artistic aspect of all the surroundings. Here, indeed, was an antipodean reversal of the mode of thought of the practical and pushful *genus Americanus*. Yet he had carried it out previously in the substitution of his artistic 'Palace Cars' for the erstwhile hideously ugly rolling-stock, and what he had proved possible and practicable in the inanimate he deemed to be possible and practical in regard to the animate. The previous idea, involving, as it did, the notion that money could be safely invested in an elaboration of the utilitarian into the artistic and beautiful, was, indeed, a startling departure. The American citizen, it had been assumed, had a sovereign contempt for anything, especially in the applied sciences, which in the slightest degree stepped over the baldest utility into the boundaries of the ornamental. It was, indeed, averred: 'If you give him the substantial with artistic surroundings and beautiful accessories, it

is reasonably certain he will expectorate on the surroundings and wipe his boots on the accessories.' Certain, all were, he would never pay for either the one or the other. Time has proved the error in regard to the cars; time has exploded the fallacy in regard to industrial communities if properly inaugurated.

An American writer assures one, now that the community has attained its majority, the workingmen of the city of Pullman 'have developed into a distinct type—distinct in appearance, in tidiness of dress—in fact, in all the external indications of self-respect. Not only, as compared with the majority of men in similar walks of life, do they show, in their clearer complexions and brighter eyes, the sanitary effects of the cleanliness, and the abundance of pure air and sunlight in which they live, but there is in their bearing and personal demeanour what seems to be a distinct reflection of the general atmosphere of order and artistic taste which permeates the entire town.' That the artistic surroundings, the absence of squalor, the invigorating boldness in design, coupled with efficient sanitation, should have had this elevating effect, may well be understood from the photographs of this model industrial city and community of some fifteen thousand inhabitants—about the same number as would—were matters similarly carried out—soon make their appearance upon the 3,800 acres of the First Garden City.

The Administration Building, Garden City of Pullman, U.S.A.

APPENDIX TO CHAPTER IV

NOTES ON THE HOUSING PROBLEM

It may be taken that, as an average, 200 rooms per acre is the allowance for block buildings. Also that in such buildings the cost of construction is £100 per room. Therefore 1 acre of block buildings costs $200 \times 100 = £20{,}000$ to build.

An acre of land laid out in cottages gives on an average 100 rooms, and in buildings of the cottage type the cost per room is £50 as a maximum figure. Therefore to obtain 200 rooms in cottages costs us only half the capital expenditure, but we require twice the area—viz., 2 acres of land. Neglecting for the moment the price of land, the building cost of these 200 rooms of cottage type will be $200 \times 50 = £10{,}000$. The difference, therefore, between the building cost of an equal number of rooms in blocks or in cottages is equivalent to about the actual cost of the latter, but the land occupied by the cottages is double.

Let us now take into consideration the effect of the cost of the land, and determine the point, in regard to price of land, at which it is immaterial whether the tenements be built in tall blocks or cottage type. In regard to our large towns, in very few cases in England has land been obtained under the Improvements Act under—or even at—£2 per square yard;* and we find that at about this price the balance to which I refer takes

* In London land has cost for the purposes of industrial dwellings, as a *minimum* (Ann Street, Poplar), £2 13s. 3d., up to as much as £22 10s. 3d. per square yard (Clare Market).

place. For, taking the cost of land per acre at £9,516 (viz., £1 19s. 4d. per square yard nearly), we have:

For Blocks containing 200 Rooms.

Cost of building at £100 per room	£20,000
„ site at £9,516 per acre	9,516
Total ...	£29,516

For Cottages containing 200 Rooms.

Cost of building at £50 per room	£10,000
„ site	19,032
Total ...	£29,032

But we must take into the calculation two other factors—namely, roads and drainage—which are found to amount to about 2s. per square yard; then we have:

For Blocks.

Cost of building	£20,000
„ site	9,516
„ roads and drainage	484
Total ...	£30,000

For Cottages.

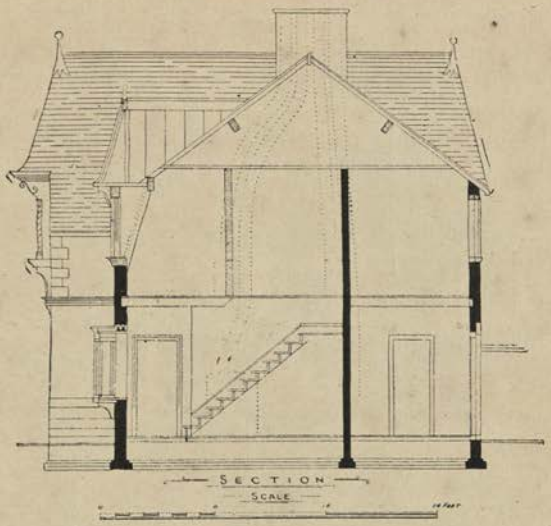
Cost of building	£10,000
„ site	19,032
„ roads and drainage	968
Total ...	£30,000

Here we see that they exactly balance. So that in cases where the land costs *less* than £9,516 per acre it is cheaper to build in cottage form, whilst in cases where the land *exceeds* that figure, 'block' dwellings become the more economical. But the cost of land in large towns *exceeds* the balancing figure of £1 19s. 4d., hence, financially, lofty 'block' dwellings are a *necessity* of town life.

It will be observed that in this consideration the rental* is not affected—albeit, tenants would probably prefer the cottage type.

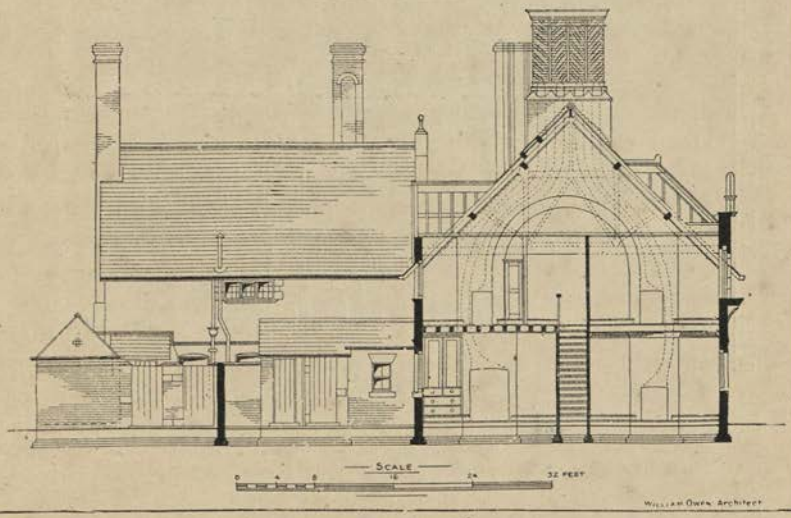
* The cost of repairs and maintenance is rather in favour of cottage dwellings, the average of these coming out at from 25 per cent. to 33 per cent. of the rental, as against from 31 per cent. to 44 per cent. in the case of block dwellings—a saving of from 6 per cent. to 11 per cent.

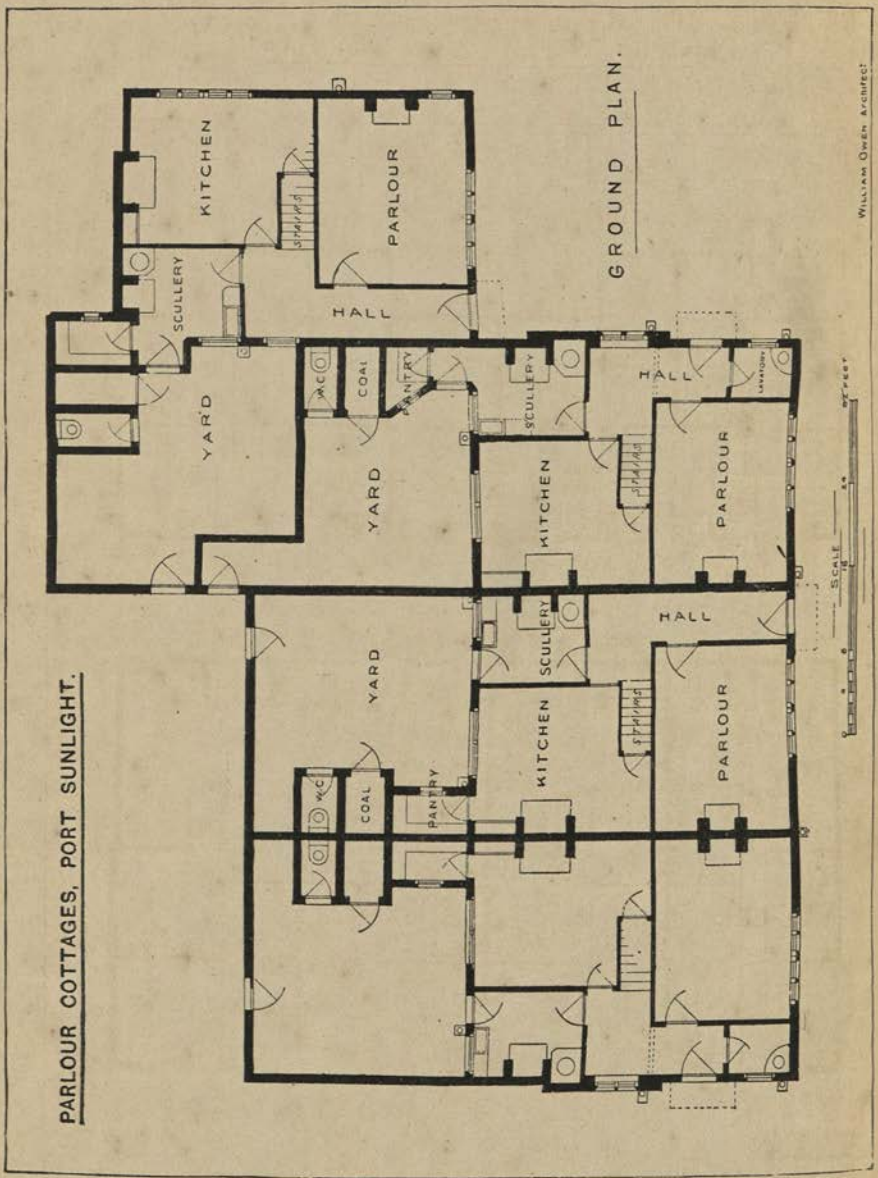
COTTAGES, PORT SUNLIGHT.



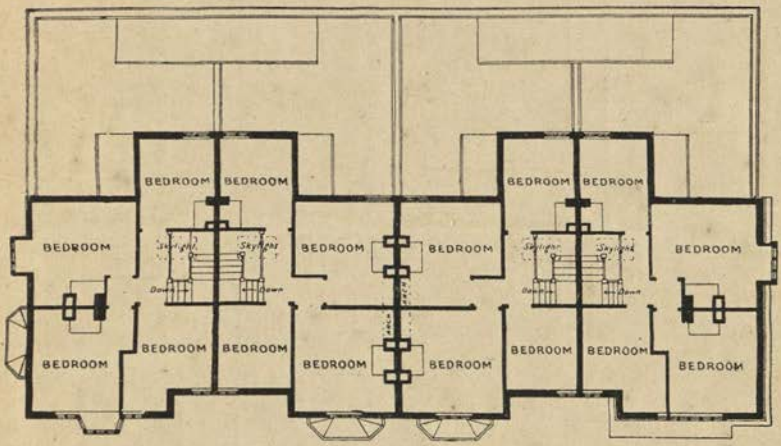
PARLOUR COTTAGES, PORT SUNLIGHT.

SECTIONAL ELEVATION

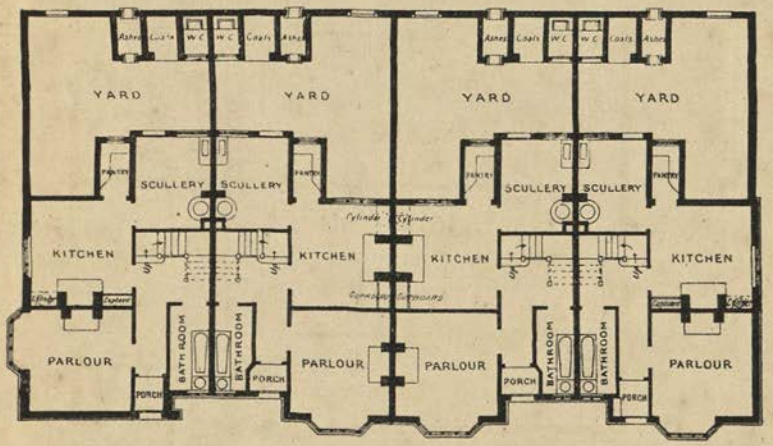



PARLOUR COTTAGES, PORT SUNLIGHT.
GROUND PLAN.
KITCHEN
PARLOUR
HALL
SCULLERY
YARD
W.C.
COAL
PANTRY
STAIRS
SCALE
WILLIAM OWEN ARCHITECT

PARLOUR COTTAGES, PORT SUNLIGHT.



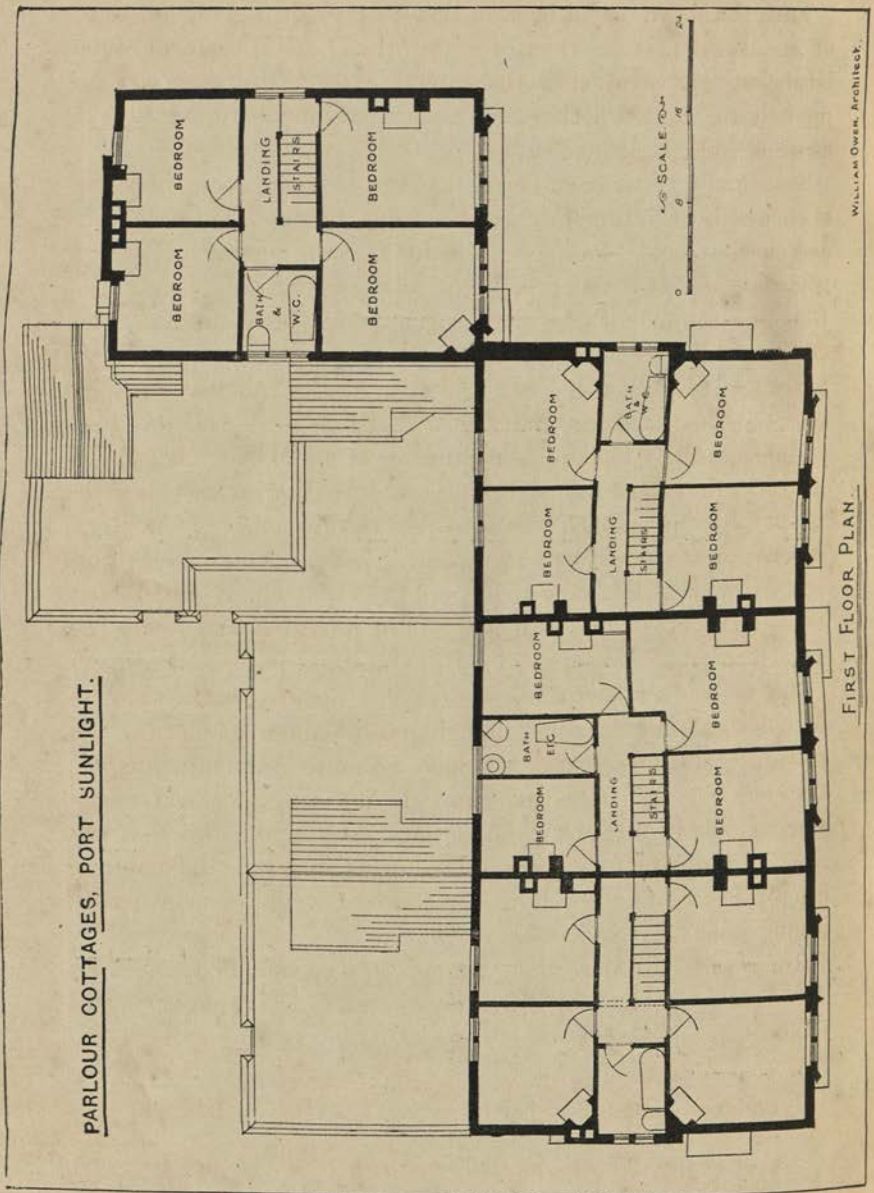
FIRST FLOOR PLAN



GROUND PLAN.

SCALE

GRAYSON & OULD.
ARCHITECTS.


PARLOUR COTTAGES, PORT SUNLIGHT.
FIRST FLOOR PLAN.
WILLIAM OWEN, Architect.
SCALE FOR
BEDROOM
LANDING
STAIRS
BATH & W.C.
BATH & E/C

From the above it will be seen that, to provide a given amount of accommodation in this case (on the L.C.C. basis of 400 inhabitants per acre), then the capital expenditure necessary is precisely the same, whether such accommodation be provided by means of cottages or blocks.

Structurally it has been found that the cost per room in lofty block dwellings is double that of cottage height; hence, in the case of cheap land, block dwellings for a given amount of accommodation are just twice as expensive as cottage dwellings. Obviously the only thing that can be done to counteract the effect of high-price land upon the industrial tenements would be to again increase their height. Now, assuming that the cost per room remains the same, and that six stories were had recourse to, then, with a capital expenditure of £40,000 instead of £30,000, the income would be increased in the ratio of as 3 is to 2. Put in another way, the rental of rooms in six-story blocks can be reduced by 11 per cent. Taking the case of eight-story dwellings, then the reduction in rental could be 16⅔ per cent. This is assuming that lifts be not provided; therefore the monetary gain is accompanied with habitation disadvantages.

Let us now see how these figures will be affected in the case of industrial dwellings put upon land of moderate price. In this case the prime cost of the land becomes nearly negligible; therefore the predominating factor is the constructional one—one, as I have already pointed out, influencing the cost per room to the extent of about 100 per cent. increase. Therefore, happily, blocks of tall dwellings in a Garden City become financially inadmissible.

To revert to the same amount of accommodation—viz., 200 rooms—the cost of providing these in a Garden City will be about as follows:

Two-story Blocks containing 200 Rooms.

Building cost at £50 per room	£10,000
Road-making and drainage at 2s. per sq. yd.	968
Cost of site, 2 acres, at £200 per acre ...	400
Total ...	£11,368

From this it will be seen that the cost of a given amount of accommodation is in round figures about one-third of that in large cities; hence, *ceteris paribus*, the rental it would be necessary to charge for exactly the same accommodation would be, roundly, only one-third. I have here taken the figure of £200 per acre because that would allow of a fair increment in repayment for the preparational cost of main drainage, road-making, etc.

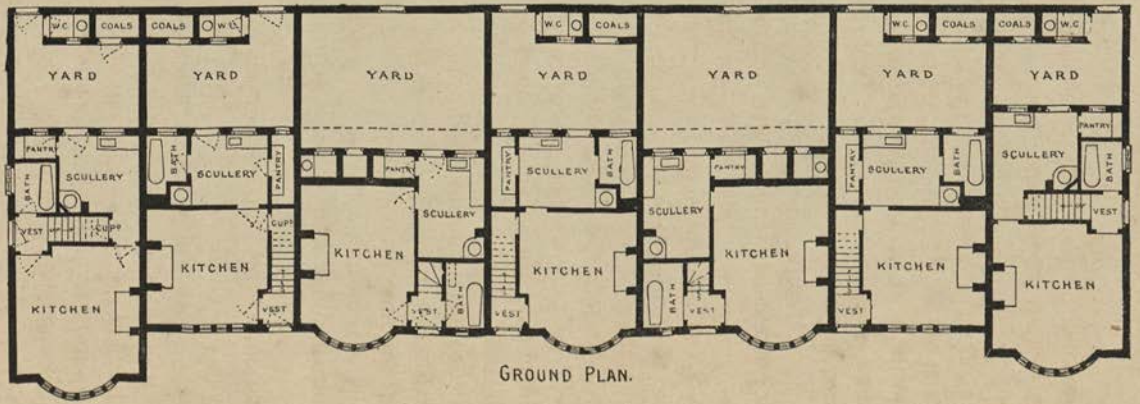
In regard to the 'First Garden City,' it is not proposed that the land should be sold; let us, therefore, see how this reduction in the value of land would affect rentals. We will assume that the rate of interest of 6 per cent. be charged as a ground-rent. This latter would therefore amount to £24 per annum for the 2 acres required for the 200 rooms. This would amount to 2s. 5d. per room per annum, as against £5 14s. per room per annum for interest at the same rate upon land in large towns. Here, then, we see the great value of Garden Cities as bearing upon the rentals it would be necessary to charge for workmen's tenements. Taking only four rooms, it will be seen that whereas it would be necessary in a town to charge *in regard to land alone* 8s. 9d. per week, the proportion of rent necessary from this cause in a Garden City *would only amount to twopence farthing.* per week. Even supposing that we take the rate of interest charged as ground-rent in towns to be only *one-half of that in Garden Cities* —viz., 3 per cent.—the disproportion still remains enormous, for it would be £2 17s. per room instead of 2s. 5d. per annum.

It may be interesting to again point out the reason for this extraordinary discrepancy. It is that large towns present what one may call a 'double-action disadvantage,' because, in addition to the great difference in ground rental,* the high price of land compels one to erect a type of building intrinsically twice as costly as the type admissible, and, indeed, far preferable, for country dwellings. The effect of land value upon industrial rental as one recedes from the centre of the Metropolis is referred to in Chapter IX.

* Garden City land at £40 per acre is barely 2d. per square yard, as against £2 cited above. In other words, town land, *at its cheapest, is one hundred and forty times as expensive.*

COTTAGES, PORT SUNLIGHT.

FIRST FLOOR PLAN.



GROUND PLAN.

J. J. TALBOT. ARCHITECT.

An Ancient English Village—showing Cottages without Gardens.

CHAPTER V

LIFE IN A GARDEN CITY

'Nothing can be more striking than the contrasts between the theory and practice of actual life, or between the things professed and those performed.'

'We put too much faith in systems, and look too little to men.'—B. DISRAELI.

'The beginning of civilization is the discovery of some useful arts by which men acquire property, comforts, or luxuries. The necessity or desire of preserving them leads to laws and social institutions. . . . In reality the origin, as well as the progress and improvement, of civil society is founded on mechanical and chemical inventions.'—SIR HUMPHREY DAVY.

To stem the gravitating tide of men and material to great and consequently overcrowded centres, and to provide means for the return of man to the land and the engagement in manufactures in the open country, are the principal objects of Garden Cities, a movement involving the solution of a problem now presenting itself to the thinking mind as one of grave and national importance.

It may be advantageous to consider, first, how these centres and agglomerations came about, and,

second, what would be the effect of the partial disintegration of great towns, and that upon the dwellers in a 'town-country' centre.

If we reflect, we shall see that it was the existence of that so useful of the four elements, water, which first determined the location of the earlier towns. Settlements were first made upon the banks of rivers—primarily because their waters were an essential of life, secondarily, but of great importance, because they afforded a means of transport. Rivers and streams, indeed, were the highways and byways of the ancients; a tree-trunk cast thereon was the primeval chariot of man, a hollow trunk—or 'dug-out'—constituted the first step in material evolution, culminating in the ocean liner of our day. It is interesting to note that the selection of aqueous as opposed to terrestrial transport marked also the commencement of a great battle, a most interesting conflict, between man and friction, a battle raging fiercely to this day, be it in regard to the huge motive engine, the fleet automobile, or the delicate timekeeper. With primitive man, however, the discrepancy between the friction entailed in water carriage and land carriage was so enormous that it was not for many centuries that road transport was had recourse to; hence towns remained upon the rivers.

Time wore on and the thinking power of man became vastly augmented, and he directed his attention to labour-saving devices: he obtained dominion

over the sturdy, slowly-moving ox, who dragged his loads for him; he conquered the spirit of that exquisitely docile, faithful, and intelligent animal—man's greatest co-worker—the horse. This quadruped not only fetched and carried his goods as well as his person, but, attached to the solitary 'whimsey,' and patiently trudging around its oft-traversed track, became another source of motive power, and as such drove some of the smaller factories. But in the silent river and the babbling stream man found far greater power when he had come to be able to construct his water-mills, his turbines, and other hydraulic motive-power engines, and hence mills and factories also became established on riparian land. Industry, indeed, may be said to have followed the courses of rivers. From these considerations it will be seen that up to a certain degree the agglomeration of dwellings and factories into towns was right, and in accord with natural law; but it has become overdone, and recalls the Biblical admonition, 'Woe unto them that join house to house, that they may be placed alone in the midst of the earth.'

It would be difficult to picture anything presenting greater contrast than rivers have wrought. In threading one's way through the busy and crowded streets of any of our great manufacturing centres 'mid the rattle of traffic over their rough cobble-stone cart-ways, on either side the rattle and roar of machinery, it requires the greatest effort of

imagination to repaint upon their sites the pristine maiden verdure, the drowsy silence of the erstwhile unsullied river's banks.

Obviously, then, there was a time when the establishment of hygienic industrial centres spread over the face of the country would have been impracticable; but man was gaining the ascendancy in his fight with friction, and the smooth rail came to replace the rough road. On it could be dragged —conveniently and economically—the fuel required for the prime movers of the mills introduced a short time prior to the advent of the locomotive, and hence to-day we find ourselves truly masters of the situation.

Life in an industrial Garden City has therefore become possible. Therefore, moreover, the large cities will become the gainers, for, whilst retaining their great mercantile prestige, they will be able to send out their factories into spots appropriately prepared for them.

Our large towns and great cities have not sprung up in mushroom fashion, and suddenly confronted us with a difficult problem; they have followed the ordinary course of development, and the evil has grown *pari passu* and continuously. Its growth, however, has not been unobserved and unheeded by the pensive, and hence concrete schemes of amelioration have been formulated, of which the proposal to build Garden Cities is the latest.

But what of the life of the inhabitants of these

subcentres, these Garden Cities? I have said, in my introductory remarks and elsewhere, that in my opinion this could be made not only more enjoyable, and the happiness of the dwellers therein mightily enhanced, but that such subcentres and their numerically restricted communities could be made unqualified successes if they be carried out—be carried on—in a bold and comprehensive spirit. If left to the ordinary *modus* of evolution and development—as has been suggested—I am persuaded a Garden City would never attain to anything much more beneficial than an ordinary provincial town, and would entirely fail to point the way to anything of national value.

I therefore assume that wiser counsels are to prevail, that not only are advantages and facilities to be provided for—and in readiness for—large employers of labour, but that the requisite 'attractions' are to be provided both for workers and residents. In this relation it is fortunate that smaller models already exist in which—though entirely private—the broader view of the requirements of the case has been taken.

One has only to go carefully through a large modern factory, there to watch intricate processes and operations being performed automatically by machinery—observe the plying of inanimate hands directed by mechanical control so perfect that the insensate, inert anatomy would almost appear to be influenced by automaton brain-power—to appreciate

that, just in proportion to the development of machinery, the human operatives tend more and more to become machines. So obvious is this that the question has been already raised as to whether it would be possible to arrange that operators should have a change of occupation during the day. How greatly this would relieve the tedium of repetition work needs scarcely to be mentioned. The practical difficulties, it also need scarcely be said, would be so great as to render it almost impossible of economic realization. The difficulty is, however, immediately overcome by the provision of appropriate mental and social recreation during the evenings. This provides at once for the required brain exercise and the desirable elevation of the mind.

There is probably nothing more elevating in art than music; there is nothing which so instantaneously can turn the thoughts out of one channel and into another. It follows, therefore, that we possess nothing more prepollent to bring instant relief to jaded body and depressed spirit than the inspiring strains of music. The experiment has already been tried, and with excellent results, of providing music during a portion of the dinner-hour. It was first tried, I believe, in connection with the printing industries of Fleet Street, London, by arranging that a band should play on the Thames Embankment during the dinner-hour of compositors, machine-minders, readers, and others of that interesting but brain-fagging occupation.

It is a matter difficult to arrange for in factories of moderate size, whilst it is impossible in small ones. If, however, the system of conjoint 'messing' I venture to suggest for Garden City be had recourse to, this desirable innovation could readily and economically be achieved.

There are those, however, on whom music has far less effect than upon the majority, especially the young, whose delight lies more in brusque and robust recreation. For these industrial occupation in the open country will have powerful attractions; for them the recreation grounds cannot be placed too near the factories.

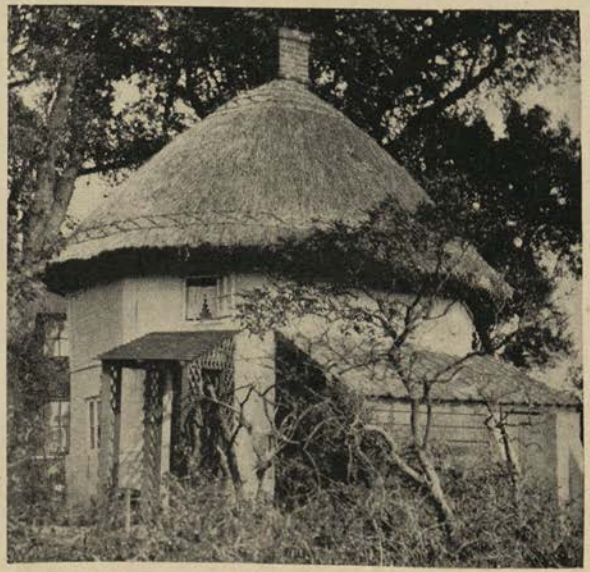
With this in view, as will be seen from the plans, I have made the People's Park and the recreation grounds adjoin; these, again, to abut upon the margin of the industrial zone. What will happen will be exactly what happens every fine day—winter and summer—in connection with country factories: the able-bodied will curtail their dinner-time and enjoy a game of cricket or football for half an hour. During that respite they, in the zest and excitement of their game, will forget all about the monotony of their work, and will re-enter the works flushed and light-hearted, and in appropriate condition to complete the day's work in a manner becoming to themselves and duly beneficial to their employers.

My suggestion, then, is that in the joint mess-room in bad weather, and in the People's Park on fine days, the workmen's orchestra should play for

half an hour, and that arrangements be made that the men of the orchestra should be able to recoup themselves of the time so employed.

So much, then, concerning a simple means of relieving the tedium of daily repetition work; for it must be remembered that it is not so much the actual toil as the monotony arising from repetition of the task which gives rise to the feeling of depression, to counteract which an antidote has been sought—very properly, in my opinion—by means of a change of employment. The idea, however, is, I fear, impracticable in face of the exigencies of the economics of production. I therefore put forward a pleasurable compromise which *can* be carried into effect, entailing, indeed, but a simple matter of arrangement.

Proper recreative facilities for the *evenings* present a wider and less trammelled field for the exercise, not only of thought and organization, but of skill, artistic ability, and, if you will, dramatic aptitude, on the part of the better educated and more favoured of the citizens. The picture of how pleasant the evenings *could* be made by the judicious merging of entertaining pastime with gradual intellectual and physical improvement—the village concert with the continuation class; the practice of art in the art gallery with practical research in the physical laboratory; the sober stroll in the park of fathers and mothers with the fleet run of the 'harriers,' their sons, across country, and the vigorous set of tennis



Circular Dutch Cottages, Isle-of-Dogs, London.

by their daughters; the dainty needlework of the art school with the utilitarian seamstressy of the mothers' meeting, and such-like—presents to us a lengthy and pleasing vista, along the paths of which the true friends of the movement are destined prominently to walk. To pursue it would carry us beyond our domain, which for the present must be confined to lending assistance in the bringing into being of a City to contain a well-organized community, amongst whom all these pleasant things may take place.

To proceed, one must 'return to the land,' for in that is contained an inexhaustible supply of pleasure, to be agreeably extracted from it by the mere exercise of pleasurable effort, which we know of itself returns in bountiful abundance; for it rewards the sower, not only by that which he shall reap, but also with that which cannot be bought, yet of inestimable worth—health.

Fortunately, it has been already proved that in gardening the average Briton *does* find inexhaustible sources of interest and amusement; indeed, strangely enough, it has been found that those who have previously lived a town life take to gardening with such zest that they make the best gardeners. Mr. George Cadbury, who has had specially good opportunities of studying this subject, speaking recently upon it, said: 'It was often said that men out of the town did not at once take to a garden. Now, in Bournville village they had specially kept the gardens

independent of the big works adjoining, because he was very anxious to offer the tenant in the village opportunities which he could not have in town. And it was truly marvellous to see how men who had spent forty or fifty years in town took to village life. They seemed to enjoy it more than men who had spent their lives in the country. Nineteen out of twenty of the townspeople took to the gardens as ducks took to water.' This, indeed, would appear to be a thing beneficently ordained and part of a natural law. Instances in substantiation of this I refer to later; at this juncture one is primarily concerned with the problem of how best to bring home —I say 'bring home' advisedly—the benefits to accrue (*to inhabitants of every grade*) from the provision—the universal provision—of gardens, as the title of the City may rightly be taken to imply.

The gardens of Garden Cities should not only be their characteristic, but their attraction, and it is sincerely to be hoped that their cognomen may never become a misnomer. There would seem to be little to fear in this regard, however, from several considerations. In the first place, such cities will be so laid out that the houses will be interspersed with gardens; the broad roads and avenues, with their grassy margins, will be, in a way, gardens, whilst the liberal open spaces will be the gardens of the municipality. These are all more or less pleasances, but the smaller villas and the trim cottages of the workmen will also have their

gardens, and these may be said to be both pleasances and profit-producers. Coupling this with the well-known love of the average Briton for his garden, it seems that we may fairly rest content upon this head. We have only to contrast the town garden with the country garden to emphasize this view. Town gardening is most disheartening. Nature seems to resent the unnatural environment and to become taciturn; freshness is not there—every flower we cull soils our hands with sooty traces.

Certain it is the public will look to the authorities of Garden Cities to largely influence the beauty of the towns under their control by the maintenance of public gardens, and in this regard residents will be more likely to rate them for want of liberality than for extravagance in floral profusion. We often see in towns—even where architecture is not at fault—a certain nakedness of the buildings, a certain barrenness of the spaces. This is due to lack of creepers upon the buildings and lack of foliage in the spaces. Everyone, I think, would be with the authorities if in their building contracts there were to be found suitable *provisos* tending to make the City as verdant as possible. These might refer to the planting of such creepers as the *Ampelopsis hederacea*, *A. inserta*, and *A. quinquefolia*. Of these, all of which are very beautiful, especially in early autumn, when their foliage turns to a vivid red, the first is to be strongly recommended by reason of its self-clinging nature, for

it fixes *itself* to the walls by means of tendrils terminating in expanding suckers. Such *provisos* should enforce the planting of the creepers immediately upon completion of the houses, the appropriate planting of trees as soon as the land has been leased, and in each case the proper *maintenance* of such foliage. In some towns in Canada, gardens, common to the inhabitants of the particular roads, are watered and cultured at public expense, with, as well as satisfactory, most beautiful results.

It is anticipated that in Garden Cities covered verandas, piazzas, and colonnades will figure prominently, and from these should depend handsome baskets of growing flowers; there should also be balconies and balustrading, and these, again, should be enlivened with standard flower containers, baskets, and vases; and, in regard to all of these, the leases of the shops might well provide that tenants shall keep these properly cared for. An excellent and economical mode of maintenance would be that, at a set charge, this work should be carried out by the horticultural students—girls as well as boys—of the Technical College.

Turning to the gardens of the villagers, fear need not be entertained as to their verdure and tidiness, nor of their effect as a feature of the City, if only the cottages and their gardens are properly arranged. Why was the Allotment Act passed? To enable working-men to have their gardens *outside* the towns,

from the unavoidable fact that they could not have them *inside*, and this for two reasons: (*a*) That sufficient vacant land did not exist; and (*b*) that if it had, its price would have been prohibitive.

Now, in a Garden City the essential principle is that an unusual amount of space shall be allotted to each house and cottage, and, further, that at the commencement the land upon all parts of the estate shall be of approximately equal value. I therefore quite fail to see why far-detached allotment gardens *per se* should be proposed or should ever exist within a '*Garden City.*'

The allotment garden is at best but a compromise—a poor enough compromise where a tired man has to walk a considerable distance to his patch, or even—as occurs in many instances—must needs travel by tram and incur expense. Why should a system—introduced to fulfil a specific object—be perpetuated in Garden Cities, where there is no *raison d'être?* Where, moreover, everything points strongly to the *in*advisability of adopting a compromise when a most beneficial change can be effected.

Surely the allotment of a larger garden to each cottage would be far more valuable to the working-man occupant and more highly appreciated. It would be more valuable because it would be always at hand, and therefore all his odd leisure moments could be spent in it. More valuable also because his wife and children could participate in the labour and pleasure of cultivating it, more appreciated

because he would be able to see so much more of it; for, whilst smoking the evening pipe—let us hope of contentment—in his porch, he could contemplate in restful leisure the results of his own cultivative handicraft.

My proposition is that the workman's allotment should be with his house, and were his opinion asked there is little doubt as to his reply. Therefore I consider this should be arranged for. This, however, is far more readily said than done, having regard to the premises I have assumed that everything in these Garden Cities should be run upon commercial lines, and hence be profit-returning to the community; but this I have already considered in a previous chapter.

The history of allotments is very interesting, but can be but briefly referred to here. In 1819 the first of a long series of enactments was passed dealing with the problem of the allotment of gardens to the labourer. This doubtless was done with the dual object of benefiting the agricultural labourers and in a measure to make good what had been lost to them by the enclosure of the common lands, moors, and the like, that had taken place. This Act empowered the churchwardens and overseers of the parish to set aside twenty acres for the use of the poorer parishioners. In 1831 this area was increased to fifty acres of garden land, and, where possible, fifty acres of forest or waste land. The working of these two Acts was not satisfactory, the chief causes of

A Modern English Village, showing Cottages with Gardens.

the failure being the merely nominal rents that were to be paid for the land and the omission of any stated size of garden to be allotted.

These defects were remedied by the Act of 1832, which set out that the rent was to be at the rate of that current in the district, and that gardens were to be not less than a quarter nor more than one acre, a further proviso being that the rents so obtained were to be devoted to providing fuel for the poor during the winter. In 1835 these powers were transferred from the overseers to the Boards of Guardians, when it was enacted that the rents were to go to the relief of poor rates. Ten years later it was enacted that such common lands as had been enclosed by the parish should be let out as allotments. Despite these Acts, little was done and but few parishes provided allotment gardens, so that in 1873 an Act came to be passed providing for the nomination of annual allotment committees by a Board of Trustees. The year 1882 saw this supplemented by fresh legislation, vesting the power to obtain allotments in four or more parishioners, by empowering the trustees compulsorily to let any charity land in the parish for such purposes, the rents to be devoted to the purposes named in the specific charity bequest. By the Act of 1887 the Sanitary Authority obtained the control and power to provide allotments. This Act also provided for the payment of compensation for all crops left in the ground by any outgoing tenant. In the following

year it was enacted that in the sale or letting of glebe lands a certain proportion must be offered to the Sanitary Authority.

At this date (1887) there were 357,795 allotments in England and Wales, whilst three years later this number had increased to 455,005. In this latter year further powers were conferred, by which any six electors had the right to appeal from the Sanitary Authority to the County Council, which body could provide the land, and then hand it over to the local authorities for maintenance. Four years later the County Councils were invested with compulsory powers of acquisition of land, together with the right of appeal to the Local Government Board. The ordinance was also fixed that no allotment should exceed four acres of pasture land, or one acre arable with three acres of pasture; but no specified minimum was assigned by these later Acts.

This may be taken to be the history of the bulk of the workmen's allotments, but there are instances of their having continued to enjoy the privileges of commoners from time immemorial. Perhaps the most interesting of such instances that could be cited is that of the ancient city of Nottingham.

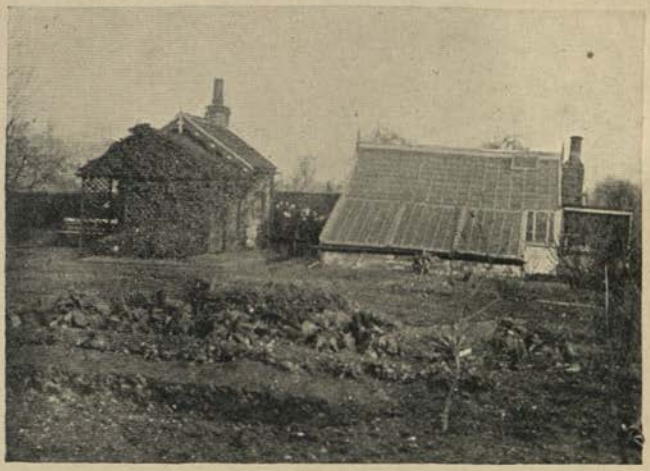
I am indebted to Sir Samuel Johnson, the veteran Town Clerk, with his forty years of municipal experience, as also to Mr. Richards, Deputy Town Clerk of this historic city, for much interesting and valuable information, of which space will only allow me to present a *résumé* to the reader. The city

Corporation have been in the advantageous position of owning much land from time immemorial, and of being lords of the manor thereof; indeed, some of their lands, portions of which are to-day workmen's allotments, were acquired by the ancestral civic authorities by purchase from King John. Centuries ago aged freemen of the city were allotted patches of land called 'Burgess Parts.' These were from two to three acres in extent, and were held for the term of their lives, subject to certain civic rules and regulations, amongst which, it would appear, were none restricting the subletting of such 'Burgess Parts.' Hence we find that the aged freemen underlet their portions to younger men who were not freemen.

Nearly a century since, however, this system of allotting 'Burgess Parts' was discontinued, and in lieu thereof the Corporation granted an annual money payment, taking back the land and letting it direct to workmen tenants. This system of letting continues to the present day, the allotments being let upon annual tenure. An interesting feature in connection with this tenure is that, so implicitly do the workmen trust the Corporation authorities in the matter of fair treatment, that, although legally liable to be evicted at short notice, they spend considerable sums upon their plots; for in times of full work the 'twist hands'—*i.e.*, the machine hands who mind the lace-making machines, or looms, and whom it would appear more appropriate to call lace-makers—earn excellent wages, often amounting to

upwards of £5 per week. It is right to mention, however, that the Corporation authorities merit such trust; for the tenant is entitled to consider he has acquired fixity of tenure, for the reason that he is never disturbed, so long as he comports himself in becoming fashion, unless the land be actually required. Even in that event he is dealt with very liberally, for he is allowed to remove everything from the land, and there appears to be an unwritten law that he receives a sum equivalent to three years' rental as compensation for dispossession.

Not only this, but the tenants build upon their plots quite well-appointed summer-houses, as well as green-houses. They are enabled to do this by means of fraternal co-operation amongst their compeers in different branches of trade, who work upon the respective portions of the buildings, principally in their leisure hours on Saturday afternoons and Sundays. I am informed that it is common for an outgoing tenant to receive from the incoming workman compensation to the extent of £50 for what he has put upon his little plot; for not only are flowers reared under glass in frames and such-like, but the greenhouses are built in a proper and substantial manner of brick and woodwork. The summer-houses contain a kind of parlour-kitchen, fitted with range, Minton tiles, a porch, and such attributes of pleasurable sojourn as one would not expect to find in them. These buildings are valued in many instances at £100 or over.



A 'Summer-house' and a Glass-house, Nottingham Allotments.

Combined 'Summer-house' and Glass-house, Nottingham Allotments.

An Allotment Garden, Nottingham.

The Village Flower Show.

In connection with one or two of the privately owned allotment lands there is, moreover, a system whereby the working-man tenant may become his own freeholder. It applies, for example, to some 500 acres upon the Porchester estate. The *modus* adopted is this: Some hundreds of acres have been purchased by land societies, formed of working men, working in friendly co-operation with the freeholders, in this wise: The freeholders plot out the land by means of roads and proposed roads 33 feet in width, the blocks being divided up into allotments of 400 yards to 800 yards, and in some cases even 1,000 square yards, in extent.

All this is done by and under the supervision of a committee, acting as trustees for the workmen members of the land society. The plots are then put up as lots in public auction, as it were, but in reality limited to the members of the society, and are bought at prices, according to the position, varying from 1s. to 4s. per yard. But the payment upon the fall of the hammer is merely nominal, payment of the balance being spread over about ten years. When all the instalments have been paid—and these are so arranged as to cover the cost of road-making—the freehold becomes the property of the tenant, and his deeds are then handed over to him.

The peculiar nature of the occupations followed by the majority of the tenants enables them to spend a portion of each day upon their plots; hence the cultivation of these Nottingham allotments is

very perfect. The productions in the domain of floriculture are, one must not forget to mention, due to much innate skill upon the part of these men who take their pleasures in this sensible and elevating manner. They carry down to their workrooms flowers such as it would puzzle many a professional gardener to produce. They scorn alike average production and mediocre success, and vie with each other in producing abnormally fine specimens.

For autumn recreation they are great with chrysanthemums, whilst for summer occupation they excel all other towns in rose-growing. Luckily, the nature of the soil is in their favour, especially that of what are known as the Hunger Hill Allotments. The industrial and industrious floriculturist will think nothing of giving up to £3 for a rose-tree of a strain suited to his fancy. Nor does this show extravagance, for during the season he will keep up weekly deliveries to London of very fine blooms. Concurrently with this he will produce excellent fruit for his own, his family's, and his friends' consumption.

The primary object of these allotment cultivators is not, however, monetary profit. They enjoy the produce, but they enjoy in a higher degree the delights of cultivation *per se*, together with the spirit of competition evinced in their friendly rivalry; and even those who may not have had a hand in the beautifying of the little patches may share the feeling of pride with which on Sunday the cultivator

shows the result of his recreative toil. On Sunday, it should be further mentioned, he, if he have been able to build him a summer-house, takes up his wife and family to his allotment, and there spends the whole day; hence the provision of the kitchen-parlour and its range.

But the percentage of those who can thus enjoy themselves is but small; hence the Sunday is spent by the workman-cultivator in a similarly unsatisfactory manner to that of workadays, for he is, so to speak, neither upon his allotment nor off it, neither at home nor away. How much better would it not be if his so carefully husbanded patch lay around his neat dwelling, if the cut flowers adorning his parlour window inside could be supplemented by his growing specimens outside!

I was glad to have the opportunity of learning the views upon this important point of these Nottingham allotment-holders, and gratified to find them strongly endorsing my view and the suggestion I have already made in the preceding chapter. Asked what he would think of having the whole of his garden around his cottage—for it must be remembered that the cottages have gardens of moderate size attached to them, thus giving rise to wasteful diffusion of labour—a 'twist hand' replied: 'Oh, that would be *proper!*'—I heartily agree. Asked why it would be more convenient for him, he put it very practically, thus: 'Yer see, mister, if t' missis wanted a bit o' parsley or a few taters, she could just pop outside

the door, and there they are, whereas we can't go trudging off a matter o' three mile there an' back for little things. Agin, I grows stummin' cabbages, but they're hardly worth the labour o' carrying all the ways home on yer back. 'Sides, the wife and childer 'ud git the benefit of the garden weekday; they could help me a good bit wee it, too.'

This, of course, is all practical common-sense, and when, in the case of laying-out a new City, one has to set apart a given area for cottages, cottage gardens, and allotment gardens, surely it would be more natural and sensible to abandon the isolated and far-removed plots, and add their area to the cottagers' gardens.

Bearing upon the important point of distance of allotments from workmen's dwellings, I should like here to insert a portion of a letter received from a great agricultural and allotment authority, the other portion of which will be found in Chapter VI.:

TWEED, LYMINGTON,
HAMPSHIRE,
October 23, 1903.

DEAR SIR,

As Chairman of the Hants County Council Allotment Committee I have been able to do much in this way. In many cases where all local efforts failed we have provided land on conditions and terms accepted willingly by the men. We also provided small holdings (68 acres) on good terms for the city of Winchester, the Town Council having altogether failed to do so. I quite agree with you that it is preferable to have a quarter of an acre at least as garden around cottages, but any trees interfere with successful culture. In the parish of Boldre and that of Sway

there are a very great number of allotments and small holdings which are of the greatest possible benefit to the labouring population. When our County Council provide allotments, we make the conditions after conference with the men, and then hand over the management to the local authorities, the rents being collected by them and remitted to us, and we pay the landowner the head-rent.

I favour quarter to one acre plots, as *here* horse cultivation is used. In some cases the local authorities have split up the plots in ten-rod ones. The usual rent, when provided privately, often is 1s. per rod, which is £8 an acre. I do not see why much more than is paid by farmers should be charged. As a rule, the men refuse to pay more than 6d. a rod in cases where our County Council have acted. Potatoes and cabbages are mostly grown. Some put an acre in peas or beans, and market their goods at Bournemouth or Southampton, besides locally. Latterly, strawberries are being grown, and around Botley and Hambledon nearly all the cottages fill up their gardens with this fruit. As to income, it is very difficult to estimate from allotment cultivation, as the men and their families consume much, and crops vary according to seasons. I am trying to encourage tomato-growing in the open. For some seven years I grew enormous crops on 3 rods in my garden, the fruit ripening excellently. I got over half a ton of fruit from 3 rods; but the last two seasons (1902-1903), the September rains, and also August, with cold weather, caused complete failure, though in both years there was a very great quantity of unripe fruit.

If allotments are over half a mile from the men's houses *they do not care for them, as they lose too much time morning and night in going to and fro*, but since most ride bicycles *now* this difficulty is somewhat lessened. In my opinion, it is of the highest importance for Garden Cities that there should be a good market for the crops near at hand; that there should be a close railway-station, and also that the soil should be deep and good.

The conditions in these parts are so very different from those indicated in your paper that it is difficult to judge of the esti-

mated benefits. Rents of men's cottages are here 2s. to 3s., and landlords pay rates when rent is under £8 yearly. They know nothing of science, and care less for it.

Agricultural wages are 12s. to 15s., and the men seem satisfied. A few may make 3s. a day; but it must be remembered that in the New Forest there are many advantages through rights of common.

Should you care to go through the rate-books of some of our local parishes, I could probably arrange for you to see them here. They are *most* instructive, as the acreage of the small holdings and allotments is given.

To grow fruit and vegetable crops to advantage, the more South it is the better, as the earlier crops fetch a better price.

Yours truly,

W. M. MOENS.

A point which had not occurred to me also came out in conversation with these allotment gardeners —namely, that some mitigation in the hardship of trudging such long distances or bicycling out to the land was to be found in the fact that the more remote gardens suffered less from the depredations of 'the boys.' This, of course, must be a source of intense annoyance to the cultivators—an annoyance, moreover, which could not well take place in gardens surrounding cottages, where the eye 'o' t' missus' upon a juvenile marauder might result in the hand of the husband upon—well, no matter.

It may be taken that allotments will always prove beneficial and be successful if the requisite conditions for their success be complied with. The area of each individual allotment must neither be too small nor too large. If too small it would not yield either the

requisite amount of produce, the desired recreation, nor provide the necessary amount of open space. It has been found that a farm labourer, for example, may have with advantage one-eighth of an acre, and that this will be sufficient to raise all the vegetables his family can consume. But a farm labourer has little leisure, and it would be better if matters could be so arranged that he should spend that leisure in some other form of recreation. Artisans, shop assistants, small shopkeepers, especially those of sedentary habits, such as bootmakers, or postmen (who, it is to be assumed, would not crave for further pedestrian exercise), and others, would have greater leisure; but, on the other hand, these might possess less skill, so that I feel the eighth of an acre for every dweller in the village would be about the correct area to allow, and this is approximately what the sixth of an acre per cottage works out to—if the buildings, yard, etc., be deducted.

If a greater area per allotment were provided for, it would increase the cost of rent of the dwellings by reducing their number per acre. Moreover, as I have shown, six families per acre is a good average upon hygienic grounds. Those who would desire more garden land could have it, for, as has already been pointed out, it is not to be assumed that every dweller would be fond of gardening, yet it is surprising how many are. Moreover, it averages itself by the fact that where one or other of the members of a family have other hobbies, one or other may love

gardening; therefore land would be available for those who desire to cultivate more than their patch of one-eighth of an acre.

As regards the time which would have to be spent upon the land, this appears to work out most satisfactorily; for it is computed that to fully work an acre of land requires 320 hours per annum—roughly, one hour a day; therefore, upon this reasoning, an hour per week would suffice for the eighth of an acre. But I am inclined to think in the case of the 'home' plots I suggest, that, taken in connection with flower-culture, the dwellers would find useful occupation for more pleasant hours than these.

With reference to the cultivation of larger patches, under usual conditions a difficulty might arise in regard to the disposal of the produce, of the profitable nature of the rearing of which—if the prices obtainable approximate to those of retail prices—there is no question. In the garden village of a Garden City this difficulty could be met in a manner unattainable under more usual conditions; for Garden Cities will have their own markets, and it will be quite easy, therefore, to arrange that a motor-waggon shall each morning go round the village and take in the produce to the market.*

Under these conditions the gardens would undoubtedly yield a handsome profit, as can be deduced from the following considerations: It has been found

* In connection with the splendid efforts at the present time being made by Lord Iveagh and the Hon. Mr. Pirrie, I have sug-

that well-worked allotments exceeding a quarter of an acre in area in the neighbourhood of towns may be made to yield a profit of over £8 per acre, a figure which would repay the labourer at the rate of 3d. per hour—taking the number of hours above mentioned—and leave him £4 additional profit at the end of the year. Allotments of a quarter of an acre and less can, on the most liberal computation of time and expense, be shown to give from £12 to £16 per acre, whilst the very carefully tabulated results of the small (one-sixth of an acre) gardens of Bournville show a profit of as much as £31 per acre, or at the rate of just under 2s. per week per cottage (1s. 11½d., to be exact).

One of the most satisfactory points brought out in connection with garden villages has been the demonstration of the almost universal love of gardening by the average Briton. At Bournville, for example,

gested systems of motor collection for the outlying districts, in the service of which the railways, having regard to the smallness of the parcels of produce to be conveyed and the distance of the farms (of which, in 1893, there were no less than 110,000 of less than 5 acres) from the stations, are quite impracticable. But a difficulty presents itself in those instances which would not arise in its application to Garden Cities—namely, as to the means of payment. In Garden Cities a weekly account would meet the case, but in Ireland, so great is the poverty and, unfortunately, so keen the distrust—both which, happily, are experiencing rapid change for the better—that this point constitutes one of the many the two pioneers I have mentioned are heroically striving to find a solution of. I refer to this again under Locomotion (Chapter VII.).

it was shown that the town office clerk was every whit as good a gardener as the labourer; on the other hand, the zest and delight of the lesser educated was found quite to equal that of the more intellectual. An observation made by Mr. Lever in the garden village of Port Sunlight bears this out in most forcible manner. On August Bank Holiday Mr. Lever took it into his head to go, with his eyes open, carefully round the village. Without wishing to make any invidious distinctions, he had it in his mind that of the different grades of culture and education the lesser advanced, which was fairly assumed to be the 'bargees,' would be found at a distance from the village, but not far from public-houses. What, then, was his surprise to see these amphibious beings busily occupied in their little gardens—saving their railway-fares, as he put it—cheerfully assisted by their wives and offspring.

So much, therefore, upon the subject of allotments, a subject of interest alike to rich and poor; for the former in this instance find it to be one of the few out of the very many enactments brought about for the good of the working man which the latter *has* turned to good and useful account, and in connection with which he *has*—a practice observable more in the breach than in the performance upon his part—*shown his appreciation.* Let us reflect for a moment as to how an allotment cultivator in a Garden City would stand in relation to those of existing large towns. It is clear he would stand at

Allotments at Port Sunlight.

a great advantage. In the first place, the ordinary town dweller cannot obtain his land in one with his cottage. Even if he could, what would be the value of it, bereft to such a deplorable extent of its sunshine? This might be put forward as an argument in favour of far-removed allotment gardens, but, unfortunately for this contention, we have staring us in the face the truly appalling figures I have quoted as footnote to this page.* From this we see that not only *his* lungs, but those of his flowers and vegetable produce—their *stomata*—are called upon to fight the battle of life with congestion and asphyxiation as their enemies; for the great smoke-clouds are perhaps more injurious to vegetation upon the outskirts of great towns than within them—in

* According to Sir W. Thiselton-Dyer, the Director of Kew Gardens, experiments at Chelsea during a London fog showed that in a week six tons of solid matter were deposited on a square mile. They included not only soot, but a variety of tarry hydrocarbons, highly injurious to animal and vegetable life. The deposition of soot and the tarry matters referred to is, of course, much greater during fog than in clear weather. It may therefore be interesting to mention the result of measurements made of the deposition in clear weather of smoke upon snow in the neighbourhood of Manchester, which showed more than two tons of solid carbonaceous matter was deposited per week on each square mile. The deposit consisted of 48·6 per cent. of carbon, 6·9 per cent. of greasy matter, and 44·5 per cent. of ashes. Experiments made near the centre of the city disclosed the alarming fact that more than three times the suburban amount was deposited; in other words, that nearly one ton of soot and ash fell upon each square mile every day.

the towns they are belched forth at some altitude, whilst in the suburbs they descend, to deposit their vast burthens of soot and tar, to which reference has been made. In the second place, if Garden Cities be laid out in the manner I advocate—namely, that each worker shall have the opportunity of cultivating, at his own door, a piece of land sufficiently large to provide for the vegetable wants of his household—he will reap beneficial economy in a twofold manner: he will not have to purchase his vegetables, and also his home-garden will cost him less in rent than ordinary far-removed allotments.

This advantage will arise from the fact that, for the establishment of such Cities, large tracts of land will be purchased at agricultural value, and this low rate of purchase price obviously will apply to *any position* in the subsequently built City. It follows that the authorities will be able to let out such land in plots surrounding the cottages at low rental, whilst still providing a reasonable increment to balance improvements in the way of roads, drainage, and the like, and for interest and amortization.

Let us now contrast this with Mr. Howard's proposal of packing the cottages close together and providing their occupants with 'allotments' at a distance from their dwellings. Their home 'gardens' obviously will be mere apologies for gardens, as one understands such in the country. For taking Mr. Howard's *average* size plot—not his smallest—namely, that having a frontage of 20 feet and a

depth of 130, the *gross area* per dwelling is only *one-sixteenth of an acre.* But from this has to be deducted the space occupied by the house and little yard. Calculating this, we find that the inhabitant really gets but two-thirds of the gross area. In other words, Mr. Howard provides for each householder only the small space of *one-twenty-fourth* of an acre.

This, reflection at once shows, is decided overcrowding, for taking his own scale of computation (5·5 per plot), the density of population would be no less than 92 per acre—a density four times greater than it should be, as laid down by such eminent hygienists as Sir Edwin Chadwick, F.R.S., and Sir Benjamin Richardson, F.R.S.

Let us therefore continue on the assumption I have taken (one-sixth of an acre per dwelling)—one which is recommended by Mr. Lever, one, moreover, actually carried into effect by Mr. Cadbury in the model village of Bournville. How, then, would the gardening villager stand in regard to his allotment? He would *not* have to fight against the smoke and soot of the allotment margin; he would not have to tramp to his gardening; he would have cheap and cleanly vegetables, bright and perfumed flowers; he would not have to walk out of the City to get 'a breath of fresh air,' but, on the contrary, he could remain at home, and occupy himself and amuse his children and household with health-giving—ay, profitable—hobbies.

ALLOTMENT GARDENS.

THE advantages derivable from Garden Cities, and there are many, will accrue in largest measure to the working-man, and of such advantages there can be no doubt one of the most appreciated will be the ample garden area provided around his dwelling. From the preceding pages it will have been gleaned that where allotment gardens are provided, they are rapidly put under cultivation by working-men tenants. It therefore appeared to me that it would prove very interesting and instructive to prepare a table showing approximately how many acres of allotment gardens have been provided in connection with our large centres of industry, the generally adopted area per plot, the rent payable, and the distance of such gardens from the centre of the cities. By the courteous co-operation of the town clerks of all our important towns, I am enabled here to present such tables. They will be found self-explanatory, and it is only necessary for me to draw attention to the fact that the manufacturing towns cited represent, in the aggregate, a population of

PARTICULARS CONCERNING ALLOTMENT GARDENS IN THE PRINCIPAL MANUFACTURING TOWNS OF GREAT BRITAIN.

Town. (For staple, see crèche tables.)	Population.	Total Area.	Average Area per Plot.	Rent per Plot.	Rent per Acre.	Things Cultivated.	Distance from Centre of Town.	Remarks.
Aberdeen ...	143,722	4¾ acres.	(*a*) 70×45 ft. (*b*) 70×22½ ft.	17s. 8s. 6d.	£ s. d. 11 0 0 4 2 0	Vegetables and flowers.	½ mile.	—
Birmingham—	522,182							
(*a*) Winson Green.	—	5 a. 0 r. 30 p.	600 sq. yards.	22s. per plot.		Usual garden produce.	2½ miles.	—
(*b*) Harborne ...	—	11 a. 3 r. 24 p.	,, ,,	23s. per plot.	5 0 0	,, ,,	3 miles.	—
(*c*) Washwood Heath.	—	12 a. 0 r. 0 p.	Not yet settled.	—	—	—	3½ miles.	—
Blackburn ...	127,527	(No allotments.)						
Bradford ...	279,809	10 acres.	200 sq. yards.	10s. per plot, and apportioned charge for water.	12 0 0	Kitchen-garden produce and flowers.	1 to 2 miles.	—
Brighton ...	123,478	31 acres.	14 rods.	9d. per rod,	6 0 0	(Unable to state.)	1½ miles.	—
Cardiff	164,420	26 acres.	26 perches.	1s. per perch.	8 0 0	(Not stated.)	1 mile.	—
Chester	46,204	(Unable to state.)	From a few perches to ½ acre.	30s. to £3.	6 0 0	Fruit and vegetables.	,,	See note (Chester).
Crewe	42,075	(No reply.)						
Exeter (St. Thomas).	53,141	3 acres.	10 land yards.	9d. to 1s. per yard (16½ feet).	—	Vegetables.	,,	See Supplementary Table.
Glasgow	760,423	(No Corporation, but private allotments.)						
Halifax	104,933	(No allotments.)						
Huddersfield ...	95,008	(No town allotments.)						
Ramsden Estate.	—	15 acres.	From 200 to 900 sq. yards.	Gardens, ¼d. per sq. yard. Hen runs, ½d. per sq. yard.	5 0 10 10 1 8	Vegetables mostly and flowers. Hen runs predominate.	¾ mile.	See note (Hudd).
Ipswich	66,622	(No reply.)						
Leeds—	437,037							
Burley	—	9 a. 1 r. 47 p.	From 250 to 550 sq. yds.	1d. per sq. yard per annum.	20 3 4	Flowers, fruit, and vegetables.	1½ miles.	—
Harehills ...	—	5 a. 3 r. 17 p.						
Leicester ...	211,574	(No reply.)						
Lincoln	51,751	(No reply.)						
Liverpool ...	684,947	(See supplementary table.)						
Luton	36,404	(No town allotments, sufficient privately let land being available.)						
Crawley Estate	—	Varies.	20 poles.	9d. per pole.	6 0 0	Vegetables and fruit.	½ mile.	—
Luton Hoo ...	—	19 acres.	,,	3d. per pole.	2 0 0	Vegetables.	2½ miles.	—
Manchester ...	543,969	(50 acres of the Blackley Estate have been purchased and set aside for allotment gardens, but no steps have as yet been taken to lay them out.)						

Particulars concerning Allotment Gardens in the Principal Manufacturing Towns of Great Britain—*continued.*

Town. (For staple, see crèche tables.)	Population.	Total Area.	Average Area per Plot.	Rent per Plot.	Rent per Acre.	Things Cultivated.	Distance from Centre of Town.	Remarks.
					£ s. d.			
Newcastle-on-Tyne.	214,803	—	—	—	—	—	—	See note (Newcastle-on-Tyne).
Norwich ...	111,728	34 a. 1 r. 14 p.	120 tenants, of whom 102 hire plots, 20 to 46 rods, and 18 hire plots, 80 rods to 6 acres. (N.B.—On change of tenancy, the land is relet in 20-rod plots.)	7d. per rod per annum.	4 13 4	On the smaller, the usual garden produce; on the larger, potatoes, beet, and other root crops most usual.	1½ miles from the city.	—
Nottingham ...	239,753	200 acres.	About 500 sq. yards, exclusive of avenues and roads. (See reference in the text.)	33s. per plot.	15 0 0	Vegetables, fruit, flowers, of all kinds; rose-growing a specialty. (See reference in the text.)	First block (about 1,000 allotments), about 1½ miles. Second block (about 250 allotments), about 2 miles. Third (and remaining) block, about 3 miles.	For remarks of Sir Samuel Johnson and Mr. Richards, see text.
,,	—	Privately owned, 800 acres.	—	½d. to 1d. per yard.	—	—	—	See note (Notts).
Southampton...	120,302	(None.)						
Stockport ...	94,422	(No allotments.)						
Swindon ...	44,996	59 a. 3 r. 31½ p.	10 to 20 perches.	6d. and 9d. per perch.	£4 and £6	General garden produce.	1½ miles.	—
Warrington ...	64,241	(No allotments.						
York	77,798	(No Corporation allotments.)						
Rowntree Allotments.	—	103 adults. 21 boys.	345 sq. yards. (Not stated.)	10s. per plot. (Not stated.)	7 0 0 —	—	—	—
Leeman Road School.	—	140 adults. 40 boys.	,, ,,	,, ,,	— —	— —	— —	— See note (Y'k).

Supplementary Table concerning Allotment Gardens in the Principal Manufacturing Towns of Great Britain.

Town. (For staple, see crèche tables.)	Population.	Total Area.	Average Area per Plot.	Rent per Plot.	Rent per Acre.	Things Cultivated.	Distance from Centre of Town.	Remarks.
Bath	49,839	(No Corporation allotments.)						
Bedford	35,144	24 acres.	(*a*) 20 poles. (*b*) 40 poles.	9s. to 12s. 17s. to 24s.	72s. to 96s. 64s. to 96s.	Vegetables.	1 to 1½ miles.	——
Bolton...	168,205	(No allotments.)						
Crewe—	42,075							
(*a*) Corporation ...	—	Small portion of sewage farm.	24×8 yards.	4s. 6d.	£5 13s. 6d.	Vegetables.	(Not stated.)	——
(*b*) L.N.W.R. Co. ...	—	(Not stated.)	10 to 12 per.	1s. 6d.	20s. and 24s.	—	Alongside railway lines.	——
Dundee—	160,781							
(*a*) Stirling Park Assoc.	—	—	—	—	—	Vegetables and flowers.	(Not stated.)	Greenhouses are favoured in all Dundee gardens; these cost from £1 to £20 to erect.
(*b*) Clepington Assoc.	—	4½ acres.	9, 6, or 4 po.	1s. 6d. per pole.	£12	,,	,,	All the gardens are managed by officers and a committee elected by the members.
(*c*) Kinnaird Gardens Assoc.	—	3 ac. 3 r. 33½ po.	Various; 108 plots altogether.	6s. to 12s.	(Not stated.)	,,	,,	Flowers are made a special point of culture.
Edinburgh	316,479	(No allotments.)						
Glasgow—	760,423							
(*a*) Victoria Gardens, Pollokshields.	—	3½ acres.	70 plots, various sizes.	10s. to 22s. 10d.	(Not stated.)	,,	,,	Managed by nine elected directors.
(*b*) Saracen Gardens, Possilpark.	—	2 acres.	3 or 6 poles.	2s.	£16	,,	,,	Let by proprietors, but managed by seven men elected from the plot-holders (water and taxes included).
(*c*) Hutchesonton Gardens.	—	7 acres.	6 poles (about).	21s.	£28	,,	,,	Managed by twelve elected shareholders.
(*d*) Victoria Gardens, Rutherglen.	—	(Not stated.)	Various sizes; 62 plots altogether.	8s. to 16s.	(Not stated.)	,,	,,	,, ,, ,,
(*e*) Cowlairs Gardens.	—	2 ac. 2 r. 23 po.	50×24 ft.	4s. 6d.	£8 3s. 4d.	,,	,,	Leased by employés of N.B.R. Co. from the company, and let out amongst themselves.
Ipswich	66,622	20 acres.	10 po. to 1 ac.	9d. per po.	£6	Vegetables.	1½ miles.	——
Kidderminster ...	26,274	(No allotments.)						
Leicester	211,574	,, ,,						
Lincoln	51,571	,, ,,						
Liverpool	684,947	,, ,,						
Oldham	137,238	(No allotments. A few exist in surrounding districts.)						
Northampton ...	87,021	,, ,,						
Paisley	79,355	,, ,,						
Perth	32,872	6 acres.	5 to 10 poles.	—	—	Vegetables and flowers.	(Not stated.)	——
Preston	112,982	(No allotments.)						——
Sheffield	380,717	21½ acres.	400 sq. yards.	12s. 6d.	£7 11s. 9d.	Vegetables.	2½ miles.	
Wolverhampton ...	74,793	(No allotments.)						

7,147,044, whilst the total area of allotment gardens amounts only to 1,347 acres, or less than a square yard ($\frac{9}{10}$) per inhabitant of the Cities.

CHESTER.

'There are here what may be called allotment gardens belonging to private individuals as well as the Corporation, and the Corporation a few years ago acquired an estate a little over a mile from the centre of the city, having in view (among other things) that it would be serviceable for allotment gardens, if recent legislation should beget a demand for them; but there has not been such demand. Many of the existing gardens are occupied by tradesmen, and not by the so-called "working class."'—SAMUEL SMITH, Town Clerk.

HUDDERSFIELD.

'The return depends much on the many purposes to which the land is put. Tenants are not interfered with. They put up all sorts of huts, and amuse themselves as they like in their small holdings. The Estate is rather particular about the fencing, and insists upon the height being uniform and level, to prevent untidiness as much as possible. Some men plant vegetables, mostly celery, lettuce, and cabbages; others a few flowers. Round every village or group of houses are allotments. We use up many odd corners of land round about the houses or land, which will ere long be built on. The allotments here number quite 1,000—rather more. They are very useful in amusing the men—preventing waste ground, which would become a nuisance, or playgrounds where such would not be desirable, from looking and becoming of no value—and helping to pay interest on the heavy streetage which has been incurred in laying out the estate.'—FREDERICK W. BEADON (MAJOR), Ramsden Estate Office.

NOTTINGHAM.

'Other landowners round the town have laid out portions of their estates in allotment gardens (pending the development of

the land for building purposes). The total number is probably between 8,000 and 10,000.'—J. H. RICHARDS, Deputy Town Clerk.

It should be mentioned that, although the distance from the market-place is considerable, these allotments, forming a fringe or girdle around the city, pass fairly close to some of the industrial suburbs. Moreover, large as is the space set apart, there is still more land available for extension. Thus, at Hunger Hill 1¼ miles), there are no less than 1,000 gardens; at Bulwell, in the extreme northerly direction (3 miles out), there are 18 acres taken up and 32 more available; whilst in the extreme southerly direction (1½ miles out, but still close to a large population) there are 32 acres taken up.

A feature of these allotments is the liberal manner in which they are laid out. They have "avenues" 12 feet wide, "cross-roads" 6 feet wide, whilst there are stand-pipes and water-taps at distances of about 150 feet apart.—A. R. S.

NEWCASTLE-ON-TYNE.

Mr. William Philipson writes: 'There are numerous allotments in the city boundaries and in the surrounding towns and villages, say, within a radius of 10 miles.'

'There are no allotments in this city under the powers of the Allotments Act. There is power to let a portion of the Town Moor for periods of seven or fourteen years, and one portion of the Moor was fourteen years ago let to a committee of gentlemen, who have divided it up into small allotments and sublet them as gardens, and, I believe, they are simply cultivated as a matter of pleasure by the tenants.'—THOMAS LAURON, Committee Clerk.

YORK.

Mr. B. Seebohm Rowntree writes: 'We give a number of prizes, and the Leeman Road Adult School organizes a horticultural show once a year, when prizes are given for the best produce and also for the best-kept allotment. There are a few

other allotments in York let at high prices, principally by people who own land which is "ripening" for building purposes. The total number of these is very small. I may say that we have a very large demand for our allotments, and there has also been a very large demand for those in connection with the Leeman Road Adult School.

'We are just commencing to build a village outside York, each house having a good garden, but we have only about six or seven houses occupied up to now, and we therefore cannot give any detailed information with regard to them. We may say that we have a very considerable number of applications for these houses.'

It will be observed that the tables refer to Great Britain only, the reason being that no allotment gardens exist in connection with the large centres of industry in Ireland, whilst with regard to smaller towns, gardens when they exist are provided and controlled by legislation differing from the Allotments Acts of Great Britain. This is shortly put and made quite clear by the reply kindly sent to me from the Secretary of the Local Government Board (Dublin); it may be useful to reproduce the passage: 'The Local Government Board understand your inquiry to refer to allotments for urban populations, and with reference thereto, I am to state that under Section 53 of Part III. of the Housing of the Working Classes Act, 1890, the local authorities under that Act (in Ireland the Urban Sanitary Authorities, now called Urban District Councils) are empowered to allot, as additions to houses or cottages for the working classes, gardens of not more than half an acre each for the purpose of cultivation,

provided that the estimated annual value of such garden shall not exceed £3 ; and this power has been availed of in the cases of, amongst others, the urban districts of Dundalk, Ennis, Kilkenny, Killiney and Ballybrack, Midleton, Naas, Navan, Nenagh, Tipperary and Tullamore, and the towns of Boyle, Ballyshannon, and Newbridge.

'By the operation of the Housing of the Working Classes Act, 1893, and the Housing of the Working Classes (Ireland) Act, 1896, read with the Act of 1890, Town Commissioners of towns in Ireland, not being urban sanitary districts, are invested with powers similar to those which, as above mentioned, are exercisable by Urban Sanitary Authorities.'

In Scotland also one finds the mode of acquiring allotments to differ from that obtaining in England. The system of acquiring land upon the part of corporations and its subsequent letting out in allotments is not carried out, but instead an association of workmen is formed, and land is rented by such associations from the landowners. These associations are carried on upon thoroughly business-like lines, and as similar associations might with advantage be formed with us, a sample set of Rules and Regulations is appended to this chapter for the benefit of working-men who may desire to associate themselves for similar objects and in a similar manner, the rules and regulations set out being selected from several Scottish associations. In this relation it is pleasing to find working-men

thus intelligently occupying themselves, and to receive letters from them giving all particulars and embodying their views on cognate subjects. One of the best of such letters is that of Mr. A. H. Rea, the Secretary of the Clepington Working-men's Gardens Association of Dundee, who, as I learn from him, is not only a floriculturist, but an author, he having published a book upon local scenery. I refer to this as showing the great value of suitable and congenial occupation for working-men such as Garden Cities will be so well able to afford, for it must be remembered, unhappily, that the town of which we are now speaking, in common with other of the larger Scottish towns, is gravely accursed by the abuse of drink.* I cannot, I think, do better than give in Mr. Rea's words an account of this Association, seeing that it is typical of the Scottish system :

'The Clepington Working-men's Gardens Association, Dundee, originally designated the Clepington Gardens Association, was founded in 1880 by a number of working-men resident in the north-east quarter of the town, who banded together and leased a piece of suitable ground extending to about 4½ acres. The object of the Association was to provide for each of its members a piece of ground where flowers, vegetables, and fruits might be cultivated. One of the members of the Town Council, along with a few

* By comparison of the number of charges of drunkenness Dundee ranks about fifth.

other gentlemen interested in the movement, became security for the initial outlay. A strong fence having been erected, the enclosure was divided into over 100 plots or allotments, the sizes being 9, 6, and 4 poles. At the first meeting called for the enrolment of members, sixty names were handed in. Afterwards the plots were balloted for, the price agreed on being 2s. per pole per annum, with an entry fee of 2s. 6d. for each member. The first Annual Meeting was held on Monday evening, October 10, 1881, when a highly encouraging statement was read and the membership was intimated as 100. Starting with a debt of £90 (cost of fencing, etc.), the Association succeeded in reducing it to £45 in 1882. It was further reduced in 1883, and in 1884 the debt amounted to £2 10s. The members then resolved to reduce the rent from 2s. to 1s. 6d. per pole, at which rate it has continued ever since. A scheme of Rules and Regulations was early drawn up, which, with subsequent additions and amendments, is still in operation.

'At the Annual General Meeting held in October, 1882, it was decided to have in the following year an exhibition of flowers and vegetables. Since that time these exhibitions have proved to be a great stimulus to the members in their efforts to excel in the beauty and value of their exhibits. In many of the allotments handsome greenhouses have been erected, by means of which, coupled with their own skill and enthusiasm, members of the Association

have entered successfully into open competitions. There has also been, with rarely an exception, a 'Gardens Competition' each year, when duly qualified gardeners have inspected the competing gardens and awarded honours to those they deemed worthy. In connection with this, it is right to state that the superior or landlord from whom the ground is leased encourages this kind of competition, and has given annually a sum for prizes. A valuable cup for a yearly rose competition was gifted by one of the City Councillors two years ago, and this year it was intimated at a social of the members that prizes will be given next season for gardens artistically designed and laid out.

'The prospects of the Association continue to be bright. Notwithstanding the number of transfers that have taken place since 1880, it is interesting to find that a few of the original members retain their plots and hold their own as well in competition or otherwise as the later enrolled members.'

It should be mentioned that these working-men secretaries and other 'office-bearers' at first work gratuitously, but when the associations have become settled down and in successful operation, a sum is voted yearly as remuneration for the time and trouble they thus expend. Space will not permit of reference to other and similar letters — albeit the working of the land in this manner and the *morale* involved are shown alike to be most gratifying, as, for example, by such a passage from a

letter of Mr. John Rodger, Secretary of Stirling Park Gardens Allotment Association, who concludes:

'From these facts I think it is clear there is a great desire for most married men to have a plot of ground, and that, if possible, beside their house. This praiseworthy ambition, I think, is what has prompted reformers to cry for Garden Cities. The obstacles to this are reasonable landholders and cheap railway or tramway fares. If landowners round cities would get it into their minds to get £6 or £8 an acre as feu duty, with the security for same by the houses on the ground in place of not more than half of that amount from a farmer, with some risk of not getting the full returns, we should be within measurable distance of working-men having a house with a plot of ground in front of it. As to what the holders grow in their plots! In the first years their crops were mostly vegetables of the usual Scotch family use, with a small part for flowers; but of late *the great love of flowers for home use, infirmaries, and the graves of friends* has led to most of the holders having greenhouses, ranging in value from £1 to £20.' It may be interesting to add that just in a similar manner to the pre-eminence in rose culture attained by the Nottingham 'twist hands,' so does it often happen that new and beautiful varieties of flowers are the outcome of the pleasure-profitable occupation of the Scotch allotment gardens.

From the foregoing lengthy considerations con-

cerning the best means of fulfilling the requirements of urbo-rural dwellers, I trust it may have been conclusively shown that the scheme of Mr. Howard, entailing the crushing together of the habitations, the provision of mere apologies for utilitarian gardens, and the setting apart of the requisite space for allotment gardens—totally unnecessary adjuncts to Garden Cities—at a distance from the dwellings of the workers, is exceedingly ill thought out.

APICULTURE AND GARDEN CITIES.

I HAVE spoken of 'hobbies.' What, for example, could be a more pleasurable 'hobby,' and where could we find one at once more *profitable* or more appropriate in a Garden City—a town of flowers—than bee culture? Simple as it may seem, such occupation should be carried on in a scientific manner, and I see no reason why it should not find place in the agricultural side of the City's Technical College, including in its regard practical demonstration and actual work in the culture. These industrious, example-setting, lesson-reading little creatures, with their well-ordered communities and their deferential respect for their rulers and superiors, have shown themselves capable of subsistence even in our overcrowded towns, wherein their directness of travel and speed of transport have won such a measure of our admiration. If this be so, why not lighten *their* labours also, and make *their* lives more pleasant?

It may be news to many that bees—like Pat's pig—can 'pay the rent.' Here is what a correspondent says of his own experience with them:

'I bought twelve bar-framed hives, with all incidentals, such as veil, smoker, etc., for £12 from a neighbour,' he remarked in the course of an interview. 'My wife takes as great an interest as I do in the bees, and our average takings for the last five years have been about £25 per annum. We have taken forty-two sections of honey per year from each hive, and I have quite easily sold these in the City among my friends at from 10d. to 1s. apiece, while in addition we have sold at least six swarms each season at 10s. each.

'I bought these bees about the end of March, and fed each hiveful with cane-sugar syrup until May. Towards the end of that month I put twenty-one sections into each hive. At the beginning of July, these sections being full, I replaced them with another batch of twenty-one, and these were removed in September. All the honey the bees gathered after the removal of the second batch of sections they were allowed to store away for winter use—a store which I supplemented for a week with a pint of syrup each day, in this way repaying them for the honey which I had removed. The hives were then warmly packed, and I saw my little friends but seldom during the winter months.

'Any suburban householder can keep from ten to fifteen hives without the attention they need interfering with his daily work. I know one man, a signalman, who bought a village public-house with money made from his bees in ten years. Another

case I remember was that of a schoolmistress, who paid for her summer holiday each year through the sale of the produce from six hives; and one other case was where a rector and village postman drew £12 each per annum from their partnership in a few hives. Up to quite recently a firm in High Holborn had large stocks of bees upon the roof of their building.'

In England we neglect the co-operation the bees are always ready to extend to us, but that is not the case elsewhere—a fact forcibly impressed upon one on seeing the numerous hives in Switzerland, many of them at great altitude. Reflecting upon the matter, it seemed to me that the pretty industry —in our country, at all events—was wanting in proper systematic control on the part of man. It would also appear that in one operation, and that the most difficult—I refer to the extraction of the honey from the comb—machinery might be introduced with much advantage.

Feeling impressed with the obvious practicability of introducing this interesting—insect-deputed—industry into the first Garden City, I beat about to find the highest authority upon the subject who might have the courtesy and enthusiasm to assist me, and thus enable me to bring the subject to the notice of my readers in a practical manner. I found him in the person of Mr. Tickner Edwardes. I also found him taking my view, and, as his letter clearly shows, bountifully imbued with the looked-for attributes. I hand it on to the reader:

'THE RED COTTAGE, BURPHAM,
'ARUNDEL, SUSSEX.
'*October* 10, 1903.

MY DEAR SIR,

'I find your letter awaiting me here on my return from town. I am exceedingly interested in your subject of "Garden Cities," and if I could be of any little service to you in the matter of bee-culture, I hope you will not hesitate to make use of me.

'A centrifugal extractor of the size mentioned would be perfectly practicable, and would indeed be absolutely necessary in apiculture on a large scale. This is where we are so much behind the Americans. Of course, our honey-flow is not so great as theirs; but there is no doubt that hundreds of tons of honey are wasted here for want of bees to gather them, and I am confident there is plenty of room in our own country for bee farms developed on the lines you sketch.

'Of course, the question of locality is a very important one. All along the South Downs, and wherever sheep are bred, there is an enormous acreage of foodstuff laid down annually, and nearly all of it is available as bee pasture. It is in these districts that big apiaries should be started. My own conviction is that, if the industry in English honey were properly developed, it would be quite possible to sell honey in two-pound sixpenny tins, like Lyle's golden syrup, and it would be infinitely more valuable as a food for the people. This view

may be a little Utopian, but, at least, it is the outcome of many years' practical experience of bees and honey-producing.

'Centrifugal extractors taking a few frames only are in common use, but a friend of mine in this neighbourhood has made an extractor on a larger scale. It is a large mash-tub, with an internal wheel carrying, I think, about a dozen cages. It works well, and demonstrates the practicability of much larger machines.

'I trust you will allow me to do anything in my power that may facilitate the work you have in hand.

'Believe me, my dear sir,

'Yours faithfully,

'TICKNER EDWARDES.'

'The conditions and privileges of life in a Garden City, valuable as they must be to every rural industry, seem to gain exceptional importance when viewed in relation to apiculture,' says Mr. Edwardes, to whom I am also indebted for the following:

'Perhaps for no other country occupation—except in the very latest times—have modern science and enlightenment done so little as for honey-farming. Bee-keeping is as old as the hills, and—taking country districts generally—is still almost as primitive. Here and there, it is true, in every county we find bee-masters who really understand their business, and treat their bees according to the most modern methods, greatly to their own advantage

and profit; but the great army of English cottage folk, to whom bee-keeping as an additional source of income should be sufficiently obvious, seem to be making little or no progress in what can undoubtedly be rendered a singularly interesting and lucrative occupation. They still hold fast to the ancient methods of their forebears. It is a comparatively rare thing to see a modern frame-hive in a cottage garden. The old-fashioned straw skep, with its wastefulness and total unmanageability, is nearly always the receptacle for the bees. Even the old senseless custom of destroying bees to obtain the honey still survives in some districts.

'And yet it is to the great class of rural working men that scientific apiculture should especially appeal. The agricultural wage is an extremely low one, and, under present conditions, cannot be increased. How, then, can an addition be made to it from other sources? Apart from the inherent lack of enterprise, always a characteristic of the hereditary country labourer in any land, there is ever this difficulty: the day's work in the fields is a long and arduous one. Any additional occupation that may be attempted must make no large call on either time or labour. It must be something that will not demand incessant care, nor be the exclusive prerogative of the man. He is usually away in the fields during the daytime. The wife, who is always at home, must be able to share in whatever supplementary work may be undertaken.

'Here, then, we find in bee-keeping almost an ideal occupation to be followed during the odd moments and intervals of the operative's busy day.* For bee-keeping as a paying industry differs in this essential point from most other occupations. Hard work cannot be said to be a prime necessary in the making of a successful bee-garden. The labour required in managing a score of hives need not fill up more than an hour a day of the bee-keeper's time, taking the whole year through. The secret of profitable bee-farming really lies in knowing how to do the right thing at the right moment; and the wife, being at home and on the spot, can easily undertake the care of as many hives as the garden will be able comfortably to contain. It is only in the few weeks of the swarming season that any continual care is necessary, and even the necessity of this can be greatly reduced, if not entirely obviated, as the bee-keeper progresses in knowledge of his art; for the aim of modern apiarian science is to abolish natural swarming altogether, and so do away with the chief obstacle to a large yield of surplus honey per hive.

'In another particular also bee-keeping is especially suitable as an additional means of income to the cottage dweller: the outlay on material can be

* It is obvious that the benefit to be derived by the workman would be very greatly enhanced by his having a garden of requisite size for apiculture around his house, instead of an allotment at a distance from his dwelling.

reduced almost to a negligible minimum. The hives can be made at home during the long, dark winter evenings. There is nothing in the construction of a hive that should tax the skill of the average amateur carpenter, provided that a suitable design—simple, yet comprising all essentials—be placed before him. And the bees—if the cottager be content to start in a small, which is really the only true, way—can be had for the proverbial old song. Every cottager knows that a skep of bees can be obtained almost anywhere for a few shillings in the off season. Usually, however, in the autumn, if the intending bee-keeper will take the trouble to learn the art of bee-driving, he can get as many stocks as he will for nothing at all. At the end of the honey season there are in most country districts people who will gladly part with their bees to anyone who will take them away and leave the owners in undisputed possession of the honey.

'This is the great chance of the accomplished bee-driver, and the process is surprisingly simple. The bees are first subdued with a little smoke, then the hive is inverted, and an empty skep fastened over its mouth. The driving, which is only a steady drumming on the sides of the lower skep with the palms of the hands, now commences, and in a very few minutes the whole population of the original hive will have deserted their dwelling and mounted into the skep above. Now, if this be gently detached and the mouth covered with netting, it can be carried to any distance, and the bees transferred

to a modern hive at leisure. The only disadvantage of this means of stocking an apiary is that the bees, having left their stores behind them, will need artificial feeding throughout the winter. This, however, presents no practical difficulty and but little expense.

'So far it is easy to make out a good case for bee-keeping as an ideal source of additional income to the underpaid farm labourer; but, given that he has several stocks of bees well established in properly constructed hives, and that he has learned to produce honey good in both quality and appearance, by far the most serious obstacle now presents itself. Unless he has the fortune to find a local customer for his honey, he is completely at a loss. Except in the case of the professional bee-master, who disposes of his wares to some wholesale firm in the large towns, and who can very well be left to take care of himself, the whole question of marketing hive produce has hitherto presented almost insuperable difficulties. If we succeed in inducing a large percentage of the cottage population of the country to lay out bee-gardens, and show them how excellent honey and wax may be produced in quantity at little cost of either time or trouble, we shall have benefited them not a jot unless we can solve for them the problem of how to get their goods cheaply and easily to the various centres of consumption. Some system of co-operation is clearly necessary, and it is just here that the Garden City movement would seem—as pointed out by the author—to hold out such healthy

promise, as well to small honey-farmers as to every other class of *petits culteurs*.

'With the question of large bee-farms, capitalized and managed on ordinary business principles, we have at present nothing to do. These may or may not come within the political horizon of Garden City. But from the point of view of a vast number of small cottage-holders, distributed over a large radius of country, and having each the produce of a dozen hives or so to dispose of annually, a central marketing depot, such as could be established in the City,* would prove of inestimable benefit. Such a head control would have in view, as a major object, not only the adequate supply of the present demand in large towns for honey, but also the work of extending that demand, which, considerable as it undoubtedly is, still appears to be strangely and unaccountably restricted. The universal need for a cheap and pure sweet food seems to be firmly established. Of late years we have seen the consumption of golden syrup amongst the large class of provident poor in town and country grow to enormous proportions. But of the relative food-value and palatability of golden syrup and of English honey there can be no question. Honey, with its wealth of grape-sugar and delicious flavour, is incomparably superior as a food for the people to any product of the sugar-cane; and if, as the present writer believes, a careful system

* See also the author's suggestion of a 'Garden City Market' in London, at which honey could appropriately be sold in conjunction with dairy produce.

of co-operation amongst the small bee-keepers that will surround Garden City far and near could produce a good and pure honey at the same low price as the cane-syrup at present so much in vogue, there is little doubt that such a supply would create for itself an immediate and ever-increasing demand.

'The details of such a scheme would have to be thought out with the utmost care. The reception, preparation, and marketing of Garden City honey in a pleasing and attractive form would be only one of many important duties that would fall to the charge of the central body. Its first and foremost care would be the maintenance of a high and vigorous strain of bees within its jurisdiction. This could be best effected by establishing a model apiary, where queens and worker bees of the finest breed could be raised, and supplied to the various members of the combination at nominal cost. Here also drones, or male bees—on whom the high quality of the common bee stock would depend as much as on the queens—could be raised in large quantities, and of the most approved species, for the general good, and the presence of drones in the outlying colonies reduced to a workable minimum. In the central bee-garden practical demonstrations of the various processes in apiculture would be given to all interested. Every tried modern appliance could be seen working, and each advance or innovation in bee science could be carefully experimented with and reported on.*

* All this could, of course, be carried on in conjunction with ectures delivered at the Technical College.—A. R. S.

'To the care also of the central body would fall the task of the regular inspection of all hives in the commonwealth for the various bee diseases. This last would be a very important part of its duties, as the entire prosperity of the scheme would depend on maintaining all hives in the district in a perfectly healthy condition. And without some system of regular inspection it would be impossible to detect the beginning of disease, and to take the prompt and vigorous measures required for its eradication. This need for a perfectly clean bill of health throughout Garden City Province would necessitate an agreement among all bee-keepers in the union not to import bees from other districts until inspection by the Garden City expert had established their entirely sanitary condition. The expert in charge of the central apiary would also visit the various bee-gardens whenever required for the purpose of giving advice as to arrangement and aspect of hives, the best means of strengthening stocks, the restricting of the drone population, the prevention of swarming and treatment of such swarms as may issue, the re-queening of colonies, and many other matters of importance that may present themselves on the spot.

'It would be the policy of the central control to encourage, as far as practicable, the home manufacture of hives. A simple, inexpensive, yet thoroughly efficient hive would be in use at the Model Apiary; and printed instructions and diagrams, clearly worded and drawn up, would be issued gratis to all

members, from which the hives could be easily constructed by anyone possessing the most elementary knowledge of carpentering. Such details as standard-frames and wood-sections, which are cut by specially-designed machinery, could hardly be made at home, but would be supplied to members at cost price. The hives also could be made very cheaply at the central establishment, and sold complete to those members lacking the necessary time or mechanical aptitude for making them. The central body could also have its own mechanical plant for turning out comb-foundation of the various kinds, and members could have their own wax made up, and so effect an enormous saving in an indispensable item.

'The commercial side of honey-farming in Garden City would need the closest attention and most complete organization. In how far the different processes and manipulations—to which honey is subjected on its journey between the hive and the table—could be centralized in an undertaking of this magnitude it remains largely for direct experience to prove. In the case of comb-honey in one-pound section-boxes very little treatment would be necessary. The cleaning of the sections, and stamping or labelling with the trade-mark of excellence, "Garden City," would leave the honey ready for the packing-case. But in dealing with extracted, or run-honey, which would form by far the larger portion of the trade, much more is needful. The honey-combs, when completed by the bees, are taken from the hives, and empty combs put in their stead.'

The full combs are then placed in a machine called an extractor, the honey is thrown out by centrifugal force, and the empty combs are then returned to the hives to be filled again. This process continues throughout the season until the end of the honey-flow.

'It would be admittedly a great advantage on the score of economy if all comb-frames in the Garden City system could be brought to the central depot and extracted in one common centrifugal machine of large dimensions. One large machine constantly employed would do the work of a host of smaller ones at a twentieth part of the cost; and the cottage bee-keeper would merely exchange his *full* combs for empty ones throughout the time of the honey harvest, without further trouble to himself than that of opening and closing the hives. But a suitable method of working should be devised to obviate the indiscriminate interchange of comb-frames between the various bee-gardens, as well as to provide for the isolation of the product of each producer, so that honey of inferior quality could be rejected.

'On the other hand, each bee-keeper in Garden City could either possess his own small extractor, or a sufficient number of these could be owned by the central body, and lent to members when required at as low a rate of interest as would compensate for the capital involved; the lock-up would be inconsiderable, and the plan should prove an entire success.

'The honey thus extracted, together with the

section-honey, could be collected at regular intervals from the different bee-gardens. At the central depot it would be examined and tested for quality. Only perfect sections, with clean white cappings, and completely filled and sealed to the corners, would be taken up by the collecting-van. Sections light in weight or misshapen would be put through the extractor with the frames. The extracted honey, after being passed by the expert, would be discharged into the common ripening vats, kept for the necessary period, and then drawn off, clarified, and bottled in the usual way. The thin honey, which rises to the surface in the ripeners, could be set aside, sterilized, and returned to the apiaries as winter food for the bees.

'With regard to the wax, all waste combs, cell-cappings, etc., would be collected in the same way, melted down at the central station, and purified and marketed on the same system as the honey.

'Viewed in the light of every difficulty, foreseen and unforeseen, the task before the head bee-master of Garden City would, of course, not be an easy one; there appears, however, to be no insurmountable obstacle in the way of any part of the scheme. Provided that the bee-pasturage of the district is sufficient in quality and extent—and in a Garden City this should be the case—there would remain nothing but what energy and organization could accomplish. Of the real demand in the country for a cheap saccharine food there can be no question. And but for the relatively high price of honey there

is little doubt that it would be preferred to any syrup or confection now before the public.'

To the First Garden City, therefore, and to the enterprise of its promoters, may be reserved the distinction not only of putting a good and pure English honey on the market at a price within the reach of all, but at the same time of ousting the foreign competitor and stopping the ever-increasing import of inferior Continental honey, which, under present isolated conditions, British bee-keepers seem powerless to do.

The supply of this delicious article of food, with the care and under the perfect hygienic conditions proposed by this authority, would, it is clear, not only prove a source of revenue, but would also constitute a well-thought-out measure of health, and I accordingly thank the writer for the trouble he has taken to enable me to lay the commercial and scientific aspect of apiculture before the reader.

From the foregoing we learn, from an authority of great experience, that apiculture would be a most appropriate 'Garden City industry'; one may therefore look forward to its introduction upon scientific lines, and of the result there need be no fear. I have elsewhere impressed the obvious advantage of everything concerning the City being of the best; and this might certainly obtain in this regard, so that probably the appropriate 'brand' of '*Garden City Honey*' shall stand as synonymous for '*the best.*'

THE SMOKE FIEND—HOT BATHS—DUST-BINS—SANITATION.

I DESERTED the Garden City *gardener* in his pretty garden surrounding his trim and creeper-clad dwelling, having first, I trust, raised his spirits by a promise implied that he should not have to battle with the smoke fiend. It is indeed a satisfaction to know the gardeners of Garden Cities will work under most advantageous conditions.

I have dealt somewhat fully with the subjects of heating and smoke prevention (in Chapter IX.), for the first Garden City, if properly designed, should present a most valuable innovation in this respect—the inauguration of a complete system of heating by cheap gas. The supply of this to industrial centres is now making rapid strides, but so far the use of fuel gas for household fires has not been entered upon to any great extent, and this for two very obvious reasons: firstly, because cheap fuel gas has not been available, and, secondly, because its supply in existing towns would necessitate the putting down, at enormous cost, of two sets of mains.

The establishment of a Garden City would afford

the longed-for opportunity of demonstrating the economy and convenience of a gaseous fuel mode of heating. In this relation I should like to say that, there having been no demand made upon manufacturers for grates suitable for gaseous fuel upon the larger scale, no appropriate and hygienic gas grates exist in which the advantages and inoffensive and pleasant nature of the newer *calorifère* can be properly seen and appreciated; but, as is well known, as soon as a need discloses itself, Science quickly steps in with an apposite fulfilment.

It is scarcely necessary for me to refer to the very great — nay, almost insuperable — difficulty which would be experienced in inducing the whole of the inhabitants of any of our large towns to, *en masse*, face the expense and great constructural inconvenience of replacing all their present stoves and fire-grates by gas-stoves and gas fires, or the equally difficult alternative of the costly process of wholesale street-breaking and the laying of mains for those who were found to possess the requisite enterprise to make the desirable change.

In the laying out of an entirely new system, on the other hand, this cost would not have to be incurred, and the fortunate cooks and housewives would neither have to face the ardent effulgence of the culinary fireplace or 'kitchener,' nor even be called upon to perform the sooty process of removing the carbonaceous deposit from cooking utensils, for the non-carburetted gas produces no deposit and is

the acme of cleanliness, both in kitchen and parlour. It is also a labour-saving device of much merit, for lady readers will, I am sure, endorse the magnitude of the absolutely wasted labour involved in the carrying of coal—it may be up flights of stairs—to the fireplaces, the 'laying' of fires, the cleaning of grates—a useless process, strongly animadverted upon by that great hygienist of whom I have spoken, the late Sir Benjamin Richardson, F.R.S.—and the dust-provoking process of removing the ashes and their consignment to the family dust-bin, there to create annoyance and great expense to the ratepayers in removal. All this is avoidable if the fuel be burned in more scientific manner—viz., in its gaseous form.

Let us now proceed to consider the cost of securing the advantages offered by this mode of heating and smoke prevention, and to ascertain if the economy will be such that these advantages shall be available to the workaday as well as to the residential inhabitants.

In making a comparison between heating by means of coal and by gas, it is impracticable to make a direct comparison of the relative calorific values of each fuel in relation to its money value, for the reason that the solid fuel cannot be put instantaneously to perform useful work, whereas in its gaseous form this advantage is secured. For example, whether it be in the preparation of a hot bath or the simple boiling of a kettle in summer,

coal stands at great disadvantage by reason of the necessity of lighting a fire specially for the purpose, consuming a quantity of fuel absurdly disproportionate to the actual work done, and almost in total waste in 'getting the fire up,' and afterwards during its 'dying out.'* With gas, on the other hand, the effect is instantaneous, and hence the fuel of higher intrinsic value may prove by far the cheaper in actual use.

The kitchen-range such as is found fitted in small tenements is, moreover, a most inconvenient appliance by reason of its small capacity, sufficing for scarcely more than the heating of a single utensil at a time. This arises from the indivisibility of a coal fire; with gas, however, without any disproportionate increase in consumption, several burners

* It has been computed that not more than one-sixth of the coal burnt in ordinary fires is used to useful effect. This, of course, means during the continuous use of a fireplace; in the example above referred to the waste would be far greater. It would be difficult to light a fire with less than one halfpenny-worth of wood and 3 pounds of coal. Now, in the furnace of a steam-boiler this amount of coal would suffice for the production of two horse-power for one hour, whereas the boiling of an ordinary kettle would represent but a very small fraction of a horse-power, say about two-sevenths. But if the halfpenny for the firewood had been spent in coal for the steam-boiler, it would have given us nearly four more horse-power. Therefore, at the cost of the boiling of the kettle, we could have obtained energy equivalent to nearly six-horse power for an hour—an amount twenty-one times greater than that actually taken from the kitchen fire and put into the kettle.

may be lighted simultaneously, and thus the requirements of a family fulfilled upon a stove of but slightly greater money value.

The necessity of lighting fires for the preparation of baths in houses of moderate size where gas is used in cooking-stoves is one of sufficient importance to arouse hesitancy upon the part of those of average means, and often, it is to be feared, brings about unwonted postponement of the health-giving and invigorating bath. How much more, then, is this shortcoming in coal consumption felt by the workman's wife and the poorer inhabitants, to whom the provision of the requisite firewood for lighting fires, as well as the coal wasted* in the manner I

* It might at first be thought that the process of heating by gas, involving the previous destructive distillation of the coal and the subsequent consumption of the gas thus obtained, must *per se* be a roundabout and wasteful operation. A little reflection, however, will serve to show that this is not the case, for it must be remembered that in an ordinary fire it is precisely this operation which takes place. The freshly thrown on coal is subjected to this process of destructive distillation, but in the most inefficient and uneconomical manner, since all the valuable bye-products are wasted with the emission of the so-greatly-to-be-avoided smoke. The operation of throwing a shovelful of fresh coal upon a fire from which more heat is required is an exceedingly unscientific one, since the process of distillation, which must be gone through before the fresh fuel can itself give out heat, is one *requiring* heat, not a heat-giving process, and hence, for a period, the fire is cooled instead of having its heat increased. At the gasworks, on the other hand, these products are recovered, and their great value goes far towards the reduction in cost of the gas supplied. Coal properly distilled

have referred to, are matters of far greater moment, the result being that the expenditure is too often made in a glass of bad and brain-befogging beer instead of in a cup of brain-clearing and energy-stimulating tea.

Such considerations as these doubtless led to the proposal—by Sir George Livesey—of the adoption of the 'penny-in-the-slot' gas meter, the gratifying success of which has abundantly proved both its utility and necessity.

The moral effect of scrupulous cleanliness is so universally admitted it need not be here referred to, except to point out that if it apply to the average inhabitant—the independent resident, the man of business, the clerically employed, and all those following cleanly occupations—how much more potent is the axiom in relation to those employed in dirt-imparting occupations, and to workmen and workwomen generally? So powerfully has this impressed itself upon pioneers in Garden village promotion that in the case of Bournville Messrs.

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yields the required heating agents in the form of gas and coke, but also in the somewhat noisome liquid by-products are contained chemical residues from which such valuable products as ammonia—which goes to the land as manure—carbolic acid—used as a disinfectant—benzine—used for cleansing clothes—and numerous other organic compounds, out of which the beautiful aniline dyes are manufactured, as well as essences and perfumes, antiseptics, used by the surgeon, and drugs. For this reason gas is frequently sold to the public at less than the cost of its production.

Cadbury have provided baths in every cottage, even those let at such small rentals as 6s. 6d. and 5s. 6d. per week,* this being done in addition to the provision of village swimming-baths.

In large towns, where public warm baths and swimming-baths are available, the cost to the average workman of frequent ablution is prohibitive, even if he could find the necessary time and energy—when tired and jaded—to go, it may be, a considerable distance to get his bath. The effect of this is that the ablutions of even the more respectable and better intelligenced operatives resolve themselves into at most a weekly warm bath, supplemented, it may be, by a few swims in summer. It is to the poorer inhabitants, then, that the moral value would be greatest of the provision of not only baths in every cottage, but economical means of obtaining an abundance of hot water.

Now, in the model City about to be built this will be quite feasible and economically practicable. For, if non-illuminating gas alone be made use of, as I suggest, and this be supplied—as it could be, after paying a dividend of at least 10 per cent. to the trustees—at the rate of 3d. per 1,000 cubic feet, then, taking the quantity of water required per adult bath at thirty gallons, the cost per bath would be *less than one farthing*, an expense

* In the case of cottages at 7s. 6d. per week and upwards, which have five rooms, the bath is upstairs; in the case of those at 6s. 6d. and under it is sunk in the scullery-floor.

almost negligible for workers in a prosperous community.

Great innovations and revolutionary changes are usually long in the coming, and the exorcism of the smoke fiend—when it shall have been consummated—will prove no exception to the rule. We are certainly, to-day, nearer to the realization of a smokeless town than we have ever been, for whilst in ordinary towns the problem is still beset with great difficulties, all the elements of success, from the engineering point of view, are to be found in connection with the building of an entirely new city, such as Garden City would be.

How long it will have been in the coming can be appreciated when we consider the centuries during which our beloved Metropolis has suffered acutely from smoke. Yet remedial measures have at many epochs been brought forward. We learn from Sir John Evelyn's 'Diary,' as long ago as January 11, 1662, that

> 'He receiv'd of *Sir Peter Ball*, the Queene's Attorney, a draught of an Act against the nuisance of y^e^ smoke of *London*, to be reform'd by removing severall trades which are the cause of it, and indanger the health of the King and his people. It was to have been offer'd to y^e^ Parliament as his Ma^ty^ commanded.'

Nay, more. Years before this we find that chemical investigations had been taking place with the view of rendering the coal itself *smokeless*—a very scientific mode of procedure, for in this, as in so many other things, we find prevention to be

better than cure. We learn of this from the same authority, who notes, under date July 11, 1656 :

'Came home by Greenwich Ferry, where I saw Sir John Winter's new project of *charring sea-coal*, to burne out the sulphur and render it sweete. He did it by burning the coals in such earthen pots as the glasse-men mealt their mettal in, so firing them without consumming them, using a bar of yron in each crucible or pot, which has a hook at one end, by which the coales being mealted in a furnace with other crude sea-coales under them, may be drawn out of y^e^ potts sticking to the yron, whence they are beaten off in greate halfe-exhausted cinders, which being re-kindl'd make a cleare pleasant chamber fire deprived of their sulphur and arsenic malignity. What successe it may have, time will discover.'*

If, as it is quite reasonable to expect, Garden City is to be a smokeless city, this fact alone will go far towards its being also a city of health. As to whether this will prove to be the case will depend upon four very important factors : (*a*) The mode of construction of the dwellings ; (*b*) the mode of cleansing the streets ; (*c*) the mode of removal of sewage and offal ; and (*d*) the mode of conduct of those functions in relation to public health, of which the civic authorities must assume the responsibilities of control. As to the first and second, I have already indulged in comment and suggestion ; as to the third, I would wish also to make a sugges-

* Some years ago Lord Dundonald, a Scotch nobleman, revived the project, but with the projected improvement of extracting and saving the tar. Unfortunately, his lordship did not profit by it. The Gas-Light Company sell the coal thus charred by the name of *coke* for fuel *for many purposes* (1816).

tion; whilst as to the last, matters under that head are at present receiving most careful consideration at the hands of the Health Committee of the Garden City Association, whose suggestions it is to be assumed will be adopted by the directors of the first Garden City to be established.

The questions of sewage removal and disposal are ones the importance of which to the health of communities cannot be exaggerated. It is one, moreover, in connection with which—as with so many other problems—improvement and innovation are sadly hampered by the fact that they can only be partially and imperfectly carried out in connection with existing systems. The fact that the city will be built upon maiden earth, so to speak, will ameliorate these conditions in a manner most pleasing to the eye of the sewage specialist, in whose hands I, for one, shall be most happy to leave it. I should, however, wish to say a word concerning that matter, of such *vital* importance to the health of towns, the *ventilation* of the drains.

Some of the experts, no doubt, will tell me I am not wholly justified in assuming that there *will be any* drains, and if these gentlemen should demand of me whether or not the removal and disposal of *excreta* by means of the 'water-carriage' system is a correctly scientific modus, I should, of course, be bound to admit that it is *not*. Water is not a disinfectant, but, on the contrary, a convenient vehicle for the conveyance of certain forms of infection; nevertheless, though the dictates of science

are to put 'earth to earth' and soil to soil, yet the water-carriage system—a system which comes to us recommended by long years of usage—presents such great advantages from the points of view of cleanliness, ready convenience, and as calling for practically no attention, that I feel this is a case in regard to which we must relax the excellent rule of following science and keeping as nearly as possible to natural processes, and join in a compromise between what is *strictly scientific* and what is *most convenient* for the inhabitants of the city.

Such an argument could but end in the installation of the almost universally adopted system, viz., of sewage conveyance by means of water; I shall therefore assume that this will obtain, and refer to my point of ventilation of the drains, since, unfortunately for those who advocate the 'dry,' or earth, system of dealing with *excreta*, they are obliged, after all, to have recourse to an ordinary system of drainage for the removal of house-water, in addition to that necessary for dealing with storm-water. This necessity, of course, can be obviated by a return to the sanitation (*sic*) of the Middle Ages, or that still obtaining in a few benighted Continental towns—namely, the simple process of emptying our slops out of window, and our baths into our gardens!

It may be said, in a word, that in those of our cities where care has been taken to bring things up to date, the present system of drainage is giving very satisfactory results *except* in the matter of *sewer and drain ventilation*. This detail leaves much to be

desired, much to be accomplished, by improvement in existing towns; yet, fortunately, it is amenable to the simplest of remedial measures in an entirely new city.

The most cursory thought serves to teach us that the present system of allowing our streets to be the receptacles for the effluvium and oft-times disease-laden gases of the sewers beneath them is *radically wrong*. It is, indeed, the height of inconsistency to take every possible precaution—by means of water-lutes, 'siphons,' 'traps,' and the like—to keep these dangerous gases out of the house, and yet to discharge them into the streets to enter our dwellings by the windows when we throw them open to let in the 'fresh air' (*sic*). The openings we find in our streets—put there for the purpose of purifying the sewers and defiling the atmosphere of the thoroughfares—are responsible for many thousands of deaths, and it behoves us to inquire whether they be *necessary* evils, or, to keep as much as may be within the confines of my subject, to consider if they be *necessary in a Garden City*. I say at once, not only that they are *not* necessary, but that they constitute serious hindrances to the efficient ventilation of the sewers.

For fear of wearying the non-technical reader, I deal with this—in every sense of the word *vital*—question in an appendix to Chapter IX. I must not, however, omit to mention here that, in the present state of applied science, the system of allowing sewer gases to escape haphazard into the streets

of towns should now be looked upon as most crude practice, as *inefficient* as it is *dangerous.*

The dictates of science in this relation are simple, and in no way differ from what common-sense reasoning would also point to. They are three: Firstly, that no sewer gases should be permitted to *escape at street-level;* secondly, that all sewers should be constantly kept partially evacuated so that *no leakage* (*outwards*) *can possibly take place;* last, but not least, *no sewer gases should be suffered to enter the atmosphere until all germs contained in them have been destroyed.*

I know of no systematic carrying out of the first-mentioned, though individual openings are sometimes closed by reason of repeated complaints of their offensiveness; the second is carried out to a small extent upon the Continent; whilst in regard to the last, an exceedingly half-hearted, inefficient, and nasty attempt is sometimes to be met with whereby the microbes are partially cooked* and discharged into the atmosphere at about the height of the first-floor bedroom windows. The three axiomatic hygienic *desiderata* I have referred to, though they may look formidable, can, as a matter of fact, be attained by the simplest of means. Essentially they require nothing more for their achievement than the closing of the detestable openings and the

* The unpleasant smell attributed to '*the gas*' in gas-stoves is largely due to the cooking of microbes. The gas is really not to blame, but the method of using it and the design and construction of the stoves in which it is consumed (see Chapter IX.).

provision of a ventilating shaft or shafts—in the First Garden City, due to the lie of the land, one would be sufficient—having constantly burning within it a coke fire. This, without machinery or complication of any kind, will play the part of '*extractor*,' maintaining the desirable partial vacuum, and '*destructor*,' destroying the microbes and discharging an entirely *harmless* gas high into the atmosphere, from which point it would in due course descend upon the verdure of the surrounding country, there to be assimilated into the bodies of every living vegetable thing.

I need scarcely say that science is prepared with certain refinements upon the system above indicated, which for generations has satisfactorily performed similar work in the ventilation of coal-mines; also that, with a little thought, even the shaft may be dispensed with. Such considerations involving practical details, being more appropriate to Chapter IX., will be found there.

I have so far digressed because I was anxious to point out not only that Garden Cities can be made cities of health, but that, by reason of their restricted areas and their *girdles of vegetation*, the scientific conditions requisite to this end can be readily complied with.

The scientific conditions having been complied with, the rate of mortality will then depend upon how the civic sanitary functions are carried out. Next in importance to an efficient sewerage system ranks the system of disposal of house refuse. This

is a matter of great importance, one upon which hygienists lay considerable stress. It is not a simple problem, and still leaves much to be desired, and a large opening for improvement in the means adopted. Next to the sewer ventilators (*sic*), probably the dust-bin and the dust-cart claim the greatest number of victims.

The magnitude of the operations involved in the collection, transport, and subsequent destruction of house refuse will be immensely minimized if fuel gas be employed, as has been proposed, in place of coal; for then we should have only to deal with organic offal and vegetable refuse. The bulk and weight of this would be small in comparison with that of the ashes, cinders, and clinker, the result of burning solid fuel.

The hygienic removal of house refuse is a matter of the greatest importance in regard to the health of the inhabitants of towns. I refer to it here because —as it will be seen—it is intimately connected with the system of smoke prevention, and rendered the more economically practicable by it. There are two principal dangers at present inherent to the storage and removal of house refuse: the first due to the generation and escape of pathogenic germ-laden gases during the process of accumulation at the dwellings; the other—a far more serious source of danger—due to the dissemination into the atmosphere of the thoroughfares of impalpable dust containing germs of zymotic diseases, which occurs with the present method of removal and tipping

into the dust-carts. This practical detail of urban sanitation—despite the fact that it has received most earnest consideration, as well as offers of rewards for an effective solution of the problem—still remains most unsatisfactorily dealt with.

The crude operation of tipping the contents of dustbins into more or less open carts is as inconvenient and offensive to the users of the urban thoroughfares as it is inimical to the general health of the community. The danger, as I have said, arises principally from the dissemination of dust; but it will be remembered that with the more scientific method of heating advocated—viz., by cheap gas—there are neither ashes nor dust to be removed and destroyed. Nevertheless, I will assume the worst, and put forth a solution for the problem of the removal of house refuse as we know it to-day without the escape of either dust or smell into the atmosphere.

In regard to the safe storage of the refuse, perhaps the best that can be done is to insist upon the use of disinfectants, in combination with metallic dustbins with closely-fitting lids.

During the last twenty years gratifying progress has been made in regard to the employment of sanitary dustbins; but what is so extraordinary is, despite most terrible teachings by disease, which from time to time has decimated towns, that in the interim people should have become—or, indeed, should have been allowed to become—so lax and neglectful.

The terrible Plague of London was no doubt attributable to defective measures for the prompt removal of *excreta* and *offal*, and hence immediately afterwards proper and common-sense measures were enforced. The then equivalent to our dustbins—the '*lay-stalls*'—were prohibited, except such public ones as were under the entire direction and control of the refuse removal contractors—to wit, the '*Fellowship of Carmen.*' The clause* relating to this ran: 'That the several inhabitants within this city and liberties, or their servants, do take care that the dirt, ashes, and soil of their houses be in a readiness for the carmen, their agents, or servants, either by setting out the same overnight in tubs, boxes, baskets, or other vessels, near and contiguous to their houses, or by bringing out the same, within convenient time, before the hours for their departure as aforesaid.' Despite this early ordinance, as years rolled by the dustbin—a huge receptacle of brick, with a wooden roof, a lid, and a slide in front—wherefrom were drawn at considerable intervals of time a heated, noisome, and dangerous mass, was allowed to find place in our large towns.

'In London the dustbin system is one of the worst and most unnecessary of sanitary grievances,' wrote Dr. Richardson only fifteen years ago—'in winter unpardonable, in summer intolerable and detestable. In the hot weather the odour of the dustbin is all

* *Vide* Act of Common Council, October 27, 1671, for Paving, Cleaning, and for Preventing Nuisances in the Streets of London and the Liberties thereof.

but universal in our modern Babylon. We enter the best houses in the best localities to become conscious of it. When we advance to it, the sense of smell is oppressed, until the stomach also learns the story. The sense of sight gathers up the same. Whenever, in wild deserts, carrion is outlaid, there also will be animals of prey; and in occupied towns and cities where carrion is laid, there also will be animals of prey—not, truly, in the shape of birds, but in the shape of those little winged, ravenous insects which we call flies, which haunt the dustbins in hosts, and by their presence indicate the putrescence that is near.* Bring near to such a place an ounce or so of strong hydrochloric acid on an open dish, and the dense white fumes of chloride of ammonium which will arise will testify clearly enough to the decomposition that is in progress at the very doors of the habitation. Into the dustbin there is too frequently put everything that can give rise to foul smell and bad air, every kind of useless organic substance the house can throw out—parings of potatoes, leaves of cabbages, remnants of salads, faded bouquets and other dead flowers, dust from the house, and portions of rags or shoes. The gases which pass off from the dustbin under these conditions are all injurious to health.'

* The pest of flies in our country and towns is almost entirely due to dustbins and stables. The dung-heaps of the latter and defilement of streets by horse-drawn traffic, have much to answer for in this respect. One of the many advantages of the introduction of horseless traffic will be felt in the great reduction of the nuisance arising from the enormous number of flies thus created.

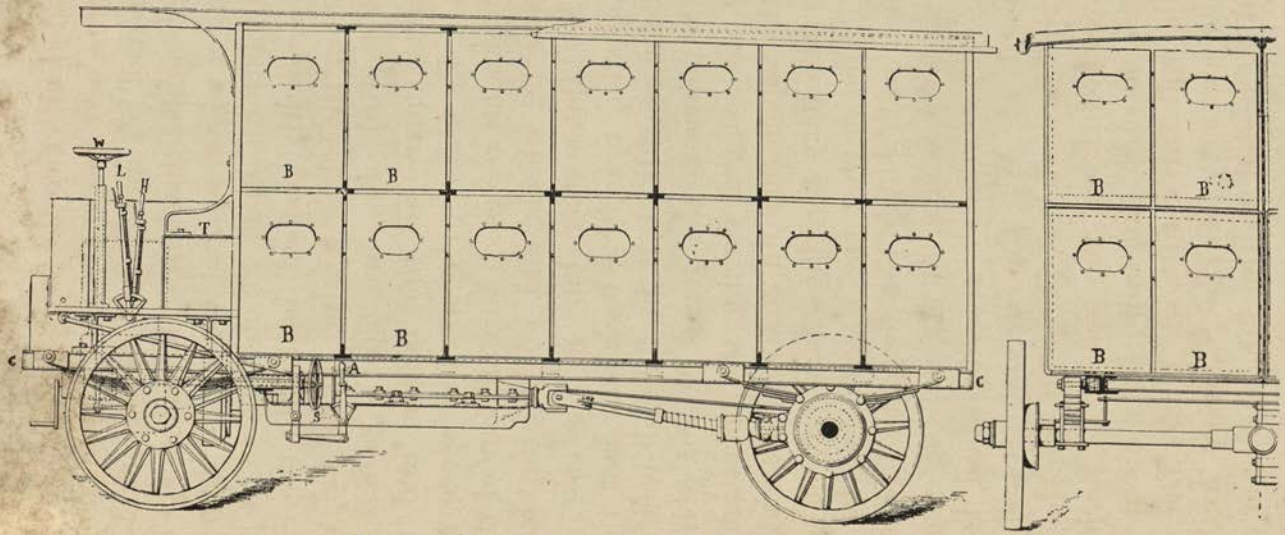
It is clear that the factors of danger are (*a*) the *volume* of refuse allowed to accumulate, and (*b*) the *time* during which it is suffered to remain in the bin for it is obvious that upon both the volume and the time depends the *quantity* of gas evolved. Now, if the *volume* of refuse be great, a large quantity of gas must of necessity escape from the bin each time the lid is raised, some of which will pass into the lungs. If the *time* be long, a double disadvantage arises, because spontaneous heating, due to incipient putrefaction, takes place, and the deleterious gases—carbonic acid, sulphuretted hydrogen, water vapour charged with the same and with microbes—will be the more copiously evolved.

Science, therefore, most distinctly says: Refuse must not be allowed to accumulate to any extent; refuse must not be allowed to stand for any length of time. It must be contained in non-absorbent receptacles, and such receptacles must be kept hermetically closed, both when standing and when being transported through the public thoroughfares.

Turning to the removal and conveyance to the destructor, the only rational and safe manner, obviously, is so to carry out the operation that the refuse shall not be thrown out of the dustbin—indeed, that the covers be not removed at all during the process of removal and transport to the destructor. The plate will serve to explain the system I have proposed.

The refuse-removal vehicle I have designed consists of a motor-propelled body—either open or closed

—provided with two platforms and a series of doors on either side, and also at the back. Each compartment forms a cell of appropriate dimensions, to contain two rectangular dustbins. The doors are hinged at their lower edges, so that they open downwards to form a platform, upon which the bin is placed, to be subsequently pushed back into the cell. The waggon in the plate has no doors, and the 'dust' bins B.B., B.B., etc., are clearly seen. They are 16 inches square at the bottom and 2 feet in height. In order to economize space they have 'sunk' handles recessed into all four of their sides. To clear the wheels and enable the body to be hung low, the sixteen bins at the rear are loaded and unloaded from the back, the last tier of bins being seen at B.B., B.B. in the half-back view. In order to obviate the necessity for the driver to mount the waggon during the operation of collection, the vehicle has an auxiliary starting-lever and also an auxiliary steering-wheel projecting from the 'near' side, so that the waggon can be steered as the men walk along the footpath. The auxiliary starting-lever is seen at A, and the steering-wheel at S. The ordinary steering-wheel is upon the footboard at W, the driving starting-lever L and the brake-lever H being on the 'off' side and worked from the seat T. Such a refuse-waggon, having a metallic body about 10 feet in length, will carry fifty-six bins. The bins would be the property of the Sanitary Authority, and would be rented to the inhabitants at a charge to



Hygienic Refuse-removal Motor Waggon (Sennett).

cover interest and depreciation. The waggon, on commencing its rounds, would be filled with empty bins, one of which would be left at each house from which a charged bin was removed. At the destructor the bins would be placed upon a conveyer and emptied mechanically into the charging hopper of the destructor.

By means of this system of motor-collection of house refuse, which would be hygienically perfect and far more expeditious than the present horse system, the refuse could conveniently be collected in the early morning, and a 'dust-cart' never make its appearance in a Garden City.

The refuse destructor, an important attribute of modern urban sanitation, is one, the operations of which are invariably attended with disagreeable results to the community. In the first place, the burning of refuse by the solid-fuel process entails the building of a lofty and unsightly chimney. The burning is always attended by a disagreeable smell, whilst a vast quantity of impalpable dust is sent into the atmosphere. Let us, therefore, reflect whether a better and more scientific method of household refuse destruction could not be had recourse to, in combination with a gas-heated and smokeless city.

It is only within recent years that the destructor has come into use, and still more recently that attempts have been made to utilize the heat developed during the combustion of the refuse, the latter economy having become feasible only upon municipalities

undertaking the supply of electricity. Mixed with house refuse is always a percentage of unburnt coal, and a larger proportion of partially-burnt coal or cinder. This, together with such of the refuse as is of a combustible nature, is capable of burning the remainder, without the addition of fresh fuel, by a process of slow combustion, which, however, as I have said, is effected in a more or less noxious manner, to the annoyance of the community, and frequently entailing litigation from this cause. The refuse from a gas-heated city would not contain coal or cinder, and would be of but meagre calorific value, due in part to the dampness of the principal constituent—viz., vegetable matter. This being so, it is, I consider, matter for serious consideration as to whether it would not be wiser—and certainly more sanitarily perfect—to dispose of it in an entirely innoxious manner by the application of external heat. My proposal is that, after mechanical separation of the light and inflammable material, such as paper, straw, etc., the residue of organic matter—animal and vegetable—should be cast into a retort and subjected to destructive distillation, the gas evolved being utilized for the extraneous heating—and the distillate subsequently mixed with the carbonaceous residuum—which is of a highly absorptive nature—to form a valuable semi-liquid manure.

The whole process would be mechanical and automatic, the refuse would never be touched by hand, and gases generated from the organic matter would not escape into the atmosphere.

Life in a Crèche.

CARE OF THE YOUNG.

In the preceding portion of this chapter I have dwelt principally upon the happiness of the working classes, the village-dwellers, as affected by their recreation —more especially profit-earning recreation. Subsequently I have touched upon, with as little of technicality as may be, the health of the inhabitants of the City, as affected by modes of municipal sanitation, and I trust the remarks and suggestions I have ventured to make may suffice concerning the engineering side of the important question of civic health.

Civic health—be it remembered—is a matter of paramount importance not only from the point of view of individual happiness, but of civic prosperity —nay! national prosperity. Health, happiness, wealth, wisdom, and national prosperity are all, indeed, *inseparably linked.* The one leads on successively to the others. Health is the parent of happiness. The two bring into being cheerful workers; the cheerful worker acquires wealth;

wealth provides the sinews of education; and education conduces to national prosperity.

Hence it is clear, not only that the first thing to be striven for is health, but that especial care and thought should be bestowed and directed to the observance of rules of health and hygiene *in regard to the young*. Physicians frequently tell us that even in middle-class society the most ludicrous—from the medical point of view, and hence dangerous—mistakes and malpractices often prevail in regard to the bringing up of infants and children. If this be so in relation to a vast section of the public who are educated, who can acquire information by reading—having the requisite leisure for it—who, moreover, can afford to obtain proper advice, how much more important—indeed, serious, from the national standpoint—is this matter in regard to the poor and operative classes?

In the working classes and with the poor, mothers, it cannot be gainsaid, stand at a great disadvantage, and this applies more particularly in instances when the mother must needs leave her home to go out to work. I have endeavoured to consider in an entirely unbiassed manner the *pros* and *cons* of domiciliary *versus* factory labour.

Time was when much might have been—and, indeed, was—written upon it, for there was much that was debatable. But time and repeated Acts of legislation, enacted for the benefit of the working class—legislation which to-day weighs more heavily

upon our manufacturers and manufactures than the conditions obtaining in other countries—have so improved, not only the condition of the workers, but the hygienic condition of factories, that there can now be no discussion as to which system is best, both for workers and for the community at large, the balance —especially from the point of view of health—being overwhelmingly in favour of the factory system.

In regard to domiciliary industries, their conduct rests with the individual, and such conduct may be highly inimical to the safety of the public. In the factory system everything is subject to strict and rigid governmental supervision ; rules and regulations are made and enforced by men of intelligence and highest authority upon sanitary matters. In the squalid home-workshop, ignorance and strife in gaining the daily bread combine to produce dangers which the factory system would in vain strive to obliterate, if the older modes of industrial occupation be allowed to subsist. In regard to factory conduct, one hears almost too much in regard to limitation of the hours of work, because it sets our industries at a disadvantage with those of other nations, and may—and in many instances has—in endeavouring to benefit the worker, throw him out of employment. One of the most serious defects possessed by the domestic system is that in that case there are no set hours. The work lies always before the eyes ; that work means money ; hence it is persevered in in season and out of season, for the

love of gain and the necessity to live o'ercomes all considerations of hygiene.

The system is bad for both worker and master. In our large towns, where rents are necessarily very high, it is obvious that in many trades the home-workers can produce work more cheaply than it can be produced in factories, the rents, rates, taxes, etc., and general running expenses of which are necessarily heavy. Hence the manufacturer, not only by preference, but by force of competition, is forced to get work done 'out.' The out-worker, in order to secure such work and bread for himself or herself and family, will undertake such work at starvation rates, forced, moreover, to do this by the atrociously enormous influx of alien labour, to whom the comfort we should like to see our own workers enjoy is quite foreign and almost unsought after. And so prices fall and employers become styled 'sweaters.' But if there were no such domiciliary work there could be no such 'sweating.' And at the worst, the effect of its abolition would be but a fractional increase of the cost of the finished goods—an effect I very much doubt, seeing that it would in all probability resolve itself into a small remission of profit upon the part of the middle-man or his extinction. No man worthy the name desires to know, when he puts on a suit of clothes costing him some £5 to £7, that—as was proved quite recently—the poor woman who put in the seams was only able to obtain for her labour the abominably low rate of *three farthings per*

hour. No woman worthy the name, when she goes down to dinner, desires to know that—when her fine gown is being admired—the women who worked at it are at that moment *without dinners.*

I must not omit to point out a matter usually lost sight of: I refer to the great hardship inflicted upon the poor as an inevitable consequence of the 'home-workshop' system through the '*sub-contract*' system. This in great measure arises from the grievous loss of time entailed upon the struggling workers through the necessity of going to fetch the material upon which they have to work, and subsequently in returning such material when it has been 'made up.' This labour—and it is ofttimes severe labour, too frequently imposed upon children, and young children weakly and anæmic from the atmosphere of their defœdated bedroom-workshops—is *not* paid for, nor are their 'bus' and 'tram' fares refunded to them, nor any recoupment for loss of time. Out of this disability arises a far graver one, for at this juncture steps in the 'sub-contractor,' who contracts for the work in bulk and becomes responsible for the distribution—a function he usually fails to carry out, leaving matters unchanged, except that, to obtain his profits, he 'sweats' the true workers. He it is who is the sweater, and not the 'manufacturer.' If the true workers worked in factory workshops—cheerful and well ventilated—this grave disability would disappear, and with it the 'sweater.' Contrast the

solitary worker—solitary confinement combined with hard labour—sitting, as Hood has so pathetically put it, 'Stitch—stitch—stitch,' in the unwholesome garret, with the workaday assemblage, congenial the one to the other, singing and cracking their jokes in the well-lighted factories of a Garden City. What wonder that the prison has little of terror for the 'solitary confined'!

The present system of the making up of garments at the homes of the operatives cannot be too strongly condemned. Not only is it conspicuously unhealthy for the work-people, but it is disease-imparting and dangerous in the extreme to the community at large. It is within the experience of all practitioners in the poorer districts of large towns that disease is imparted to the goods under 'making up'; they will tell you they have seen the half-made riding-habit of the fair customer forming the coverlet of the fever-stricken child; the overcoat of the aged statesman affording warmth to an infected mother. The personal observation of these facts by such a man as Richardson was not passed over unnoticed; hence he proposed to obviate this danger by the provision of 'workmen's offices or work-rooms' in convenient parts of his City, where each workman or workwoman could, on payment of a moderate sum per week, have the use of such rooms conditionally upon their not being used as living-rooms. Consideration, however, will serve to show that the antidote of the good doctor is quite im-

practicable. At the very outset it means at least doubling the rental the worker would be called upon to pay.

These few remarks, I trust, will serve to show that instead of wasting energy in the discussion of 'factory *versus* home labour,' and lavishing much ill-placed sentiment upon the latter, such effort would be far more philanthropically and patriotically directed to the abolition of home-work and the slums in which it is carried on. I know of nothing, in the remotest degree, so likely to bring about this so-desirable change, and to obliterate a twentieth-century scandal, as the establishment of Garden Cities. And, if it will not be deemed presumption upon my part, I would desire not only to point out how a start in this philanthropic direction could be made, but to depute its realization very much into the hands of the *Women's Leagues*—associations of voluntary female supervisors, which undoubtedly should be formed in connection with such cities.

The first of these decentralizing devices is to be established a matter of only some thirty miles from our great Metropolis. We know that every night an immense weight of goods to be cleaned and dyed passes close to the site of the proposed City. Why should not goods to be mended and 'made up' be nightly conveyed to such hygienic industrial centres? In the succeeding chapter I refer to my visit and inquiries made in Nottingham to ascertain the state of the 'making-up' trade. I see no useful purpose to

be fulfilled in harrowing the feelings by dwelling upon the fact that, outside the clean and well-ventilated work-rooms, in which I saw hundreds—in the aggregate of workshops, thousands—of girls and women neat and clean, apparently happy and profitably employed, there exist slums and squalid dwellings in which certain operations not amenable to mechanical treatment are carried on in the very opposite manner, where the conditions of health are absent, where the conditions of danger and disease-dissemination are ever present. I pass this over with the suggestion that if such ladies would come forward and organize such 'making-up' establishments, the sinews of war in the fight with poverty, dirt, disease, and degradation would be readily forthcoming, for the more than sufficient reason that the expenditure of the necessary—and quite small—capital would bear upon its face the promise of safe investment combined with lasting good.

As a practical engineer, I may perhaps be allowed to pledge my word that, with the means now at hand for horseless transport of the goods in question, the cost of their collection, conveyance to such Garden Cities, and return to the Metropolis would be quite negligible with the work carried on, as it should be, upon a scale of some magnitude. I would further advocate that the operations involved should be carried on in the most perfect manner in all respects, including strict compliance with hygiene. All *worn* goods to be disinfected on entering the

little factory ; *all* goods to be similarly treated upon leaving it. Let the merchant-tailors, the gown-makers, the repairers of garments, announce that their work is carried on under such conditions and in Garden Cities, and in a short time the bulk of goods going down by road shorter distances would rival those I refer to as going by rail nightly to Scotland. Here would be a slum-emptying device carried out upon *profit-producing* lines, a benefit to masters—or mistresses—a boon to workers.

The importance of such work, affecting the happiness of the distressed, the crippled, and the aged, cannot be too highly estimated ; but, from a national point of view, it is beginning at the wrong end. It is obvious the importance is aggrandized if it affect rather the physique, as well as the happiness, of the rising generation ; and therefore, in connection with the factory system, there is a matter of great importance which should certainly be touched upon. I refer to the care and custody of children during the hours when the mothers are absent from home at the factories. Personally, I am much averse to the employment of *married* women in factories at all, for it obviously has a compound-interest rate of disadvantage. A woman who has to perform a day's labour in mill or factory should not be called upon, in addition, to attend to her children and carry out the necessary household duties. It would be far better if operatives would wait, in regard to marriage, until their wages would

permit of the husband *only* being the wage-earner, for in that way an operative blessed with a good wife would derive infinitely more comfort from a home in which his wife had spent her day in its care and arrangement. How can it be expected that a woman can prepare meals for herself and husband when her whole time is occupied in the factory, to the hours of which she, of course, must conform?

Unfortunately, there are considerations which defeat the *desideratum*. There is, of course, the case of widows, but more important still is the consideration of human frailty, which upsets the best-arranged plans for health and happiness; for where there is a steady operative blessed with a good wife, there are dozens of well-meaning wives cursed with bad husbands, and they, too, have to work in mills and factories. To such a wife the greatest kindness that could be done for her—far better than charity—would be to relieve her anxiety in regard to her children during her working hours.

Feeling the importance of this subject, and in order to collect information which might be of value in organizing a proper and suitable system for adoption in Garden Cities, I have communicated with all the large manufacturing towns in England, Scotland, and Ireland. The result is shown in the tables hereto appended.

For the inception of a means of dealing with the situation we again have to look abroad—to the

French, who have given the name of 'crèche' to their system, by means of which a suitable place is provided where the children of the poor, absent from home during the day, are taken care of and supplied with food and clean clothing until called for in the evening. It was first established in Paris by Madame Marbeau in 1801, and the word 'crèche,' the French equivalent for 'manger,' was adopted as the title of the system, in remembrance of the birthplace of the infant Christ. The word, however, is not unknown in the English language, as in an old edition of the New Testament by Whittingham, in 1557, the word 'crèche' is used instead of 'manger.'

The first 'crèche' was not opened in London until nearly three-quarters of a century later (1871), this having been done at the instance of a Mrs. Hilton, and by the kindness of the Society of Friends, in the East End. This has been the pioneer of a number of similar institutions in various parts of London. But London is not, essentially, a manufacturing city, and it is noticeable that in truly industrial towns, such as our textile centres, where such are most needed, they are conspicuous by their absence, for the want is very inadequately met. This arises, doubtless, from the fact that the subject is viewed in the light of a charitable one, and Paris and London probably stand unrivalled in the measure of their charity.

The 'crèche' gives the working woman full liberty

to work and support her family, with the sense of confident feeling that her child is being taken care of under the most hygienic conditions, that it is in tender keeping and clean clothing, that it has appropriate food given regularly under a doctor's supervision, and that it is in both adult and infantile company all tending to its baby happiness.

The Congress of Sciences, at their Glasgow meeting in 1874, strongly advised the adoption of the 'crèche' system all over the kingdom; and the Rev. Elder Cumming, in a remarkable speech, proved by statistics that, in the towns, infantile mortality was 37·56 per 100 of the total number of deaths (this number being raised to 50 per 100 in Liverpool), while the mortality in children taken regularly to the 'crèche' came as low as 8 per 100.

The French 'crèches,' undoubtedly the best managed, in all cases are fitted with the latest hygienic improvements, and are under the supervision of the municipality. They are governed by a board of directors, assisted by a ladies' committee, each member paying a minimum of 100 francs (£4) a year as *subscription*, and attending at the 'crèche' one day each week or month, according to their number, but so arranged that the institution should be visited every day during the year by a member of the committee, in order that everything should be carried out with the most scrupulous care. These ladies are also expected to do a share of needlework to supply the poor children with clean and neat

clothes. The 'crèches' are spacious buildings generally on two floors, divided into dormitories, *pourponnières*, or rooms for changing the clothes and feeding the infants, playrooms, etc., and are so arranged as to provide 3,500 cubic feet of air to each twenty children, of whom from sixty to one hundred (seldom more) are taken. These establishments are open from 5.30 in the morning until 8.30 at night. They are closed on Sundays, and no children are kept beyond the hours mentioned on week-days.

Rules are strictly enforced—as, for example, that the nurses are not allowed to accept gratuities from the parents under pain of instant dismissal. Children are admitted from the age of fifteen days to five years. Their birth and vaccination certificates—it is a *sine quâ non*—must be produced, and no child suffering from any illness or disease is allowed inside the 'crèche.' One nurse is assigned to every six children, each having its own cot, toilet set, and feeding-bottle. The parents generally pay a fee of twopence per day; and each mother must give the address where she is employed, so that she can be immediately fetched in case of emergency.

The children are taken out for walks in fine weather; and it is a really interesting and amusing sight—which may be seen by any visitor to Paris on a warm summer's day in the Tuileries Gardens—to watch these little mites, so clean and tidy, trotting along the paths two by two behind one or two large

perambulators, each containing eight to twelve infants, and all guarded with assiduous care by a staff of neat nurses.

In Paris, moreover, where charity is apparently endless, much maligned 'society' has found the means of not only coming to the rescue of children, but—by means of *asiles ouvriers*—to help the expectant mother, so as to give her a fair chance to give birth to her child in the best conditions possible for the benefit both of mother and child. For that purpose several establishments exist in Paris where a woman can be received at any period of the last six months before the birth of her child is expected. We might take as a model the *Asile Pauline Roland*. This contains 157 beds, 21 cots, and 19 cradles. The women to be admitted must be of good health, and able to work either in the laundry or at needlework. They get board, lodging, and clothes, and a remuneration varying from twopence to sixpence a day. They rise at six in summer and half-past six in winter, retiring to bed at nine in summer and eight in winter, and work eight or nine hours per diem.

In this relation, it is pleasurable to observe that the charity here carried into practice is *true* charity, because by its nature it cannot be abused—genuine charity also, because it is extended *to all* who need it. But who needs it more acutely than the unwed prospective mother? It is a hollow form of charity which adds to her sufferings by casting her out as

lost and irretrievable—a form of charity unhappily prevalent with us. In the conduct of the *asiles ouvriers*, one finds that some six weeks before the approximative date of the child's birth these women are sent to another *asile* in connection with the one named. There they are received without any papers or identification, being left free to preserve *incognito* if they so desire. They are not compelled to do any work, except to keep the establishment clean, attend to their beds, and such like. They prepare their baby's *layette*, or mend their own clothes. The most absolute secrecy is kept concerning their names, whether single or married; and even in extreme cases of police inquiries, no answer is given except on a special order from the Minister of Justice. They can receive any visitor they wish; but it is only on presentation of a special card stamped by the administration and signed by themselves that the doors are opened. A cot and *layette* are given to each one. Mothers who have several children are particularly protected, and their children are taken care of while they remain at the *asiles*. Work is also found for them when they leave, and the baby cared for at one 'crèche' or another in the daytime.

Turning to our own country, the result of my inquiries, comprising all our principal cities of industry, are given in tabulated form; the following tables showing the position of 'day nurseries' as obtaining with us.

Town.	Population.	Staple Trade.	Number of Institutions.	Date of Opening.	Capacity.			Maximum Capacity.	Ages at which Taken and Refused.	Hours.	
					Beds.	Cots	Cradles.			Opened at—	Children Retained until—
Aberdeen.	143,722	Quarrying.	—	—	—	—	—	—	—	—	—
Belfast.	348,965	Linen manufacture.	Three (two closed at present).	1898	—	16	4	25 children.	One month to five years.	6 a.m.	7 p.m.
Birmingham.	522,182	Hardware.	None.								
Blackburn.	127,527	Textile.	None.								
Bolton.	168,205	Textile.	None.								
Bradford.	279,809	Wool and woollen goods.	One (the 'Nest').	1884	—	12	See remarks.	25	Four weeks to five years.	6.30 a.m.	6 p.m.
Brighton.	123,478	Mothers usually charwomen.	One.	1875	—	12	9	40	Three weeks to eight years.	8 a.m.	8 p.m.
Cardiff.	164,420	—	None.								
Chester.	46,204	—	None.								
Cork.	99,693	—	None.	—	—	—	—	—	—	—	—
Crewe.	42,075	—	None.								
Dublin (Meath Street).	289,108	—	Three.	1893	—	—	—	30 (7,989 taken in 1902).	Two months to four years.	8 to 9 a.m.	6 to 7 p.m.
Dublin (Power's Court).	—	—	No reply.								

* This nursery supplies the needs of only one small district. About £200 per annum is given by two gentle
Average daily attendance, 18½ last year. Total attendance in 1902, 5,554. A number of children are always

Staff.	Fees. Day.	Fees. Week.	Accommodation.	Cubic Feet of Air per Child when Full.	Qualifications for Admission.	Management.	Remarks.
—	—	—	—	—	—	—	Crèches, or day-nurseries, have from time to time been established here on a small scale by charitable organizations and individuals, but after a short existence they have had to be discontinued, either from lack of financial support or otherwise (*vide* excerpt Town Clerk's reply).
Three nurses, one secretary.	3d.	—	—	—	All healthy babies taken.	Committee of ladies, qualified doctor.	The general committee consists of ladies and gentlemen, thirty in number (originally organized by Lady Henson).
Matron, one head-nurse, one assistant nurse, one servant, and a washer-woman one day per week.	3d.	1s.	One dressing-room, 16 ft. by 10 ft. by 9 ft. in height; one day-room, 34 ft. by 15 ft. by 10 ft. in height; one play-room, 32 ft. by 15 ft. by 9 ft. 6 in. in height.	—	Necessity for mother to work.	Committee of ten ladies.	A 'pound' for eight older babies over sixteen months. One of the ten ladies is hon. medical officer, attending once a week and when sent for. One lady is visitor for each month, and goes twice a week. Hon. secretary visits once a week, and keeps all books.*
One matron, one head nurse, two assistant nurses, two servants.	4d.	1s. 10d.	Dressing-room, 14 ft. by 11 ft. by 13 ft. in height; dayroom, 34 ft. 17 ft. by 9ft. 8 in. in height; play-room, 48 ft. by 28 ft. by 10 ft. in height.	—	Children of mother obliged to work.	Matron and executive committee.	The general committee consisting of nine persons, is supplemented by a reference committee of six. There is an hon. treasurer and hon. secretary.
—	—	—	—	—	—	—	No reply from Town Clerk, even after repetition.
Matron, two assistant nurses, one servant.	1d.	7d.	Large nursery, dining-room, kitchen, large yard, bathroom, matron's rooms, etc.	—	Must be children of respectable women dependent on their own exertions for support, recommended by employer or clergyman.	—	Committee of seventeen persons. Supervision, hon. secretary; visiting by the committee.

men for its maintenance, as no appeal is ever made for funds. The mothers' fees amount to £50–£60 per annum. waiting for vacancies to occur.

Town.	Population.	Staple Trade.	Number of Institutions.	Date of Opening.	Capacity.			Maximum Capacity.	Ages at which Taken and Refused.	Hours.	
					Beds.	Cots.	Cradles.			Opened at—	Children Retained until—
Dublin (Wentworth Place).	—	—	No reply.								
Dundee (Isles Lane).	160,781	Jute and kindred fibres, confectionery.	Three.	1885	—	8	10	40	Infancy to six years.	5.30 a.m.	6.30 p.m.
Dundee (Hillbank).	—	Jute and kindred fibres, confectionery.	—	1886	—	8	10	30	One month to six years.	5.30 a.m.	6.30 p.m.
Dundee (Lily-bank).	—	Jute and kindred fibres, confectionery.	—	1891	8	4 double.	5	24	Two weeks to eight years.	5.30 a.m.	6.30 p.m.
Edinburgh (Holyrood Square, first opened in Cannongate about 1880).	316,479	Mothers principally charwomen.	Three.	1903	4	2 (swinging).	7	—	Fourteen days to eight years.	6.30 a.m.	7 p.m.
Edinburgh (Stockbridge. Original 1894).	—	Mothers principally charwomen.	—	1899	2	6	8	30	Two weeks.	6.30 a.m.	6.30 p.m.
Edinburgh (Fountain Bridge. Original 1892).	—	Mothers principally charwomen.	—	1901	8	1	15		Infancy. No limit.	6.30 a.m.	6.30 p.m.

Staff.	Fees. Day.	Fees. Week.	Accommodation.	Cubic Feet of Air per Child when Full.	Qualifications for Admission.	Management.	Remarks.
Matron-nurse, one assistant nurse, one servant.	4d.*	Infants, 2s.; children, 1s. 6d.	—	—	Forms of admission must be signed by clergyman or respectable householder.	—	Two or more children of same family, 2d. per day each.*
Matron-nurse, one assistant nurse, one servant.	—	—	Children's dining-room, small; day-room, 17 ft. 6 in. by 11 ft. 6 in. by 10 ft. 6 in. in height; play-room, 17 ft. 6 in. by 11 ft. 6 in. by 10 ft. 6 in. in height.				
Matron, one head-nurse, no assistant nurse, one servant.	Infants up to fifteen months, 4d.; over, 3d.*	Infants, 2s.; children, 1s. 6d.	Dormitory, 16 ft. by 14 ft. by 10 ft. 6 in. in height; day-room, 24 ft. by 14 ft. 9 in. by 10 ft. 6 in. in height; play-room, 24 ft. by 14 ft. 9 in. by 10 ft. 6 in. in height.	—	Good health and cleanliness.	—	Two or more of one family, 2d. each per day.*
Matron, one head-nurse, cook.	3d. per child, 4d. per infant.*	—	One day-room, 36 ft. by 11 ft. by 9 ft. 3 in. in height; one play-room, 20 ft. by 9 ft. by 9 ft. 9 in. in height; bathroom.	—	Doctor's certificate of non-infectious disease.	Acting committee of ten persons.	Two or more from one family, reduction of ½d. per child.* Hon. supervision: One hon. superintendent, a committee, and hon. physician.
Matron and head-nurse combined, one assistant nurse, one servant.	3d. per day if over one year; infants, 4d.	—	One day-room, 20 ft. 6 in. by 14 ft. 7 in. by 11 ft. in height; play-room, 21 ft. by 14 ft. by 11 ft. in height; two good bedrooms, kitchen, bathroom.	—	Good health.	Matron, acting committee of thirteen persons.	Honorary: A doctor attends once a week and when required. A lady superintendent and a committee. The nursery is appreciated as a great boon to its district.
Matron, one head-nurse, one servant.	3d. per day if over one year; infants, 4d.*	—	Dormitory, 14 ft. by 13 ft. by 12 ft. in height; one day-room, 17 ft. by 17 ft. by 13 ft. in height; bathroom.	—	Freedom from disease.	Matron and acting committee.	The halfpenny reduction for more than two of one family.* Honorary: Lady superintendent and physician. There is an asphalted court for use in fine weather. *Dinners* are served to school-children at 1d. for those who have brothers or sisters in the nursery, 2d. to outsiders.

Town.	Population.	Staple Trade.	Number of Institutions.	Date of Opening.	Capacity.			Maximum Capacity.	Ages at which Taken and Retained.	Hours.	
					Beds.	Cots.	Cradles.			Opened at—	Children Retained until—
Exeter.	53,141	—	None.								
Glasgow (Partick).	760,423	Shipbuilding and engineering.	One.	1887	—	6	6	32 in one day.	Ten days to eight years.	5.30 a.m.	6.30 p.m.
Glasgow (Anderston District).	—	—	One.	—	—	3	6	No specified limit.	One week.	5.30 a.m.	6.30 p.m.
Glasgow (Bridgeton).	—	Weaving and confectionery factories.	One.	—	—	7	4	30	One week to six years.	5.30 a.m.	6.30 p.m. (2.30 p.m. on Saturdays).
Glasgow (Milton District).	—	Shipbuilding, iron foundries, engineering, glass, etc.	One.	1883	—	9	5	40	Six weeks to six years (up to ten for dinner only).	5.30 a.m.	6.30 p.m. (2.30 p.m. on Saturdays).
Glasgow (Hutchesontown District).	—	Biscuit and preserve factories.	One.	1889	—	8	8	40	Four weeks to six years (school age).	5.30 a.m.	6.30 p.m. (2.30 p.m. on Saturdays).
Halifax.	104,933	Textile.	None.								
Huddersfield.	95,008	Textile.	None.								
Ipswich.	66,622	—	None.								
Kidderminster.	26,274	Carpets.	None.								
Leeds.	428,953	—	None.								
Leicester.	211,574	—	None.								
Lincoln.	51,751	—	None.								

TOWNS OF GREAT BRITAIN—*continued.*

Staff.	Fees. Day.	Fees. Week.	Accommodation.	Cubic Feet of Air per Child when Full.	Qualifications for Admission.	Management.	Remarks.
One matron, one assistant.	3d.; if more than two, 2d. each.	1s. 6d.	One play- and day-room, height 14 ft., length 25 ft., breadth 12 ft.; one cradle-room, height 14 ft., length 7 ft., breadth 10 ft.	—	Recommended by two householders.	—	Committee of fifteen, who meet once a week. Hon. treasurer supervises, also makes up accounts. Members of committee visit nurseries once a month in turn.
One matron, one servant.	3d.	1s. 6d.	One day-room, length 18 ft., breadth 12 ft.; one play-room, length 16 ft., breadth 12 ft.	—	Medically certified to be free from infectious disease.	One lady member of committee of the association.	There is not a committee for individual nurseries, but one lady of the committee acts as joint secretary and treasurer. Aggregate attendance of children for the year: 1901, 5,201; for 1902, 4,479.
One matron, one assistant nurse, one servant.	3d.	1s. 6d.	One day-room, height 10 ft., length 18 ft., breadth 12 ft.	—	—	Committee of fifteen ladies.	Lady treasurer supervises. This nursery has the advantage of an open-air playground for the children.
One matron (£20 per annum), one servant (£12 per annum).	3d. for one, 6d. for two, 8d. for three, of one family.	—	One dressing-room, height 9 ft., length 10 ft., breadth 7 ft.; one day-room, height 11 ft., length 19 ft. 3 in., breadth 10 ft.; one play-room, height 11 ft., length 25 ft., breadth 15 ft.	—	Family clean and respectable.	Ladies' committee.	Committee of fifteen persons. Supervised by four directors and hon. secretary and hon. treasurer. Attendance varies from ten to thirty per diem.
One matron, one assistant nurse, one servant.	3d.	1s. 6d.	One dressing-room, height 11 ft., length 13 ft., breadth 6 ft.; one day-room, height 11 ft., length 13 ft., breadth 14 ft.; one play-room, height 11 ft., length 22 ft., breadth 18 ft.	—	Clean bill of health from doctor.	Committee of ladies.	Supervised by lady treasurer. Children of school age can have dinner, and are charged 1d. Any mother detained one or two hours later at her work can, by arrangement, leave her children, on payment of an extra charge of 1d. per child. If more than one, the third child is charged 2d. per day.

Town.	Population.	Staple Trade.	Number of Institutions.	Date of Opening.	Capacity.			Maximum Capacity.	Ages at which Taken and Refused.	Hours.	
					Beds.	Cots.	Cradles.			Opened at—	Children Retained until—
Liverpool.	684,947	—	None.								
London (see separate table).											
Luton.	36,404	Straw hats.	None.								
Manchester (Hulme).	548,960	—	One.	—	—	—	—	—	Under eight years.	Six o'clock, or earlier by arrangement.	6 p.m., or later if the mother is detained.
Newcastle-on-Tyne.	214,803	Mining and engineering.	None.								
Norwich.	111,728	Crêpe.	None.								
Northampton.	87,021	Boots.	None.								
Nottingham.	239,753	Lace and hosiery.	One.	1875	For staff only.	4	4 'pound.'	35	One month to seven years.	8 a.m.	6 p.m.
Oldham.	137,238	—	None.								
Paisley.	79,355	Thread and jam.	One.	1880	—	—	12	35	Six weeks to six years.	5.30 a.m.	6.30 p.m.
Perth.	32,872	—	None.								
Preston.	112,982	—	None.								
Sheffield.	380,717	—	One.	1873	—	—	—	—	One month to five years.	7.30 a.m.	7 p.m.
Southampton.	120,302	—	None.								
Swindon.	44,996	—	None.								
Warrington.	64,241	Chemicals.	None.								
Windsor.	13,958	Mothers work principally in laundries or at charing.	One.	The present house December 7, 1903	—	12	12	No limit.	Two or three weeks to six years.	7 a.m.	7 p.m.
Wolverhampton.	74,199	Hardware.	None								

PRINCIPAL TOWNS OF GREAT BRITAIN—*continued.*

Staff.	Fees.		Accommodation.	Cubic Feet of Air per Child when Full.	Qualifications for Admission.	Management.	Remarks.
	Day.	Week.					
—	3d.	—	—	—	Admission forms must be filled, and freedom from infectious disease.		
One matron, one head-nurse, one servant.	—	6d. to 1s. 6d., according to poverty of parent.	One day-room, one play-room, one dressing-room, one kitchen with bath.	—	Loss of father or mother, or sickness of either.	Matron is responsible.	There is a receiving committee of four persons. Members of committee supervise. Children are not taken if both parents are alive, unless one is certified too ill to work.
One matron, one nurse, one day-servant.	3d.	1s. 6d.	Day-room and play-room, both large and airy. Cots are in a separate room.				
—	For one child 2d. per day; 1d. for each additional child of one family.						
Matron, one head-nurse, one assistant nurse, one servant, and char-woman.	4d., half-day 2d., two from one family half price.	—	One dressing-room, one day-room, one play-room.	—	Children must be clean and of respectable parents.	Visiting committee, superintendent, and visiting doctor.	Commenced good many years ago in small house, subsequently adjoining house was taken in. Present crèche was originally a school belonging to Corporation of Windsor.

Town.	Population.	Staple Trade.	Number of Institutions.	Date of Opening.	Capacity.			Maximum Capacity.	Ages at which Taken and Refused.	Hours.	
					Beds.	Cots.	Cradles.			Opened at—	Children Retained until—
York.	77,793	Sweet factories.*	One.	—	—	—	—	—	Any age, and many go to school and return for dinner.	7.30 a.m.	5.30 p.m.

PROVISION OF CRÈCHES

District.											
Agnes (St.)—45, Wilmington Square, W.C.		—	One.	1889	—	6 and 1 'pound.'	3	—	Three weeks to five years.	8 a.m.	8 p.m.
Boro'—127, Union Street, S.E.		—	One.	1876	—	—	—	30	One month to four years.	8 a.m.	—
Chelsea—60, Arthur Street, S.W.		—	One.	1871	—	—	—	—	—	7 a.m.	8 p.m.
Clerkenwell—Field Lane Institution, Vine Street, E.C.; 154, St. John Street Road.		—	One.	1878	—	—	—	25	—	—	—
Deptford—33, Creek Road.		—	One.	1891	—	5	16	30	Two weeks to four years.	8 a.m.	8 p.m.
Finsbury—Banner Street, E.C. Hampstead.		—	One.	—	—	—	—	—	—	—	—
Holborn—8, Greville Street, E.C. (in connection with St. Alban's Mission).	(Particulars	—	not One.	received) 1878	2	10	3	30	One month to six or seven years.	8 a.m.	8 p.m.
Hoxton—Hyde Road; Mortimer Road, Kingsland; Gopsal Street, N.		—	One.	1884	—	—	—	Weekly average, 106	—	8 a.m.	7.30 p.m.
Islington—Essex Road.		—	—	1878	1	—	—	20—30	Eighteen months to three years.	9 to 12 a.m. 2 to 4.30 p.m.	During school hours.

PRINCIPAL TOWNS OF GREAT BRITAIN—*continued.*

Staff.	Fees. Day.	Fees. Week.	Accommodation.	Cubic Feet of Air per Child when Full.	Qualifications for Admission.	Management.	Remarks.
—	2d. to 4d.	—	—	—	—	Sisters of Charity.	Fifteen children is the largest number that has been brought. The mothers are mostly charwomen or field labourers; consequently there are more children on fine days than during wet weather.

FOR LONDON.

The sisters, one servant.	4d.	—	—	—	Marriage certificate.	Sisters of Bethany.	Children over five years go to school, return for meals, and wait till fetched.
—	3d.	—	—	—	Marriage certificate.		
—	4d. for one; 6d. for two in one family.						
—	3d. and 4d.						
One matron, one head-nurse, two assistant-nurses.	3d.; two same family, 5d.		Dressing-room, two day-rooms, one play-room.			Committee of ladies.	
—	3d.						
Sisters and matron, two nursery-maids, five lady servants, who take turns.	3d.	1s. 6d.	One day-room, 21 ft. 3 in. by 13 ft. 5 in., by 9 ft. 9 in. in height; one play-room, 16 ft. 8 in. by 15 ft. by 8 ft. 1 in. in height; one kitchen, 14 ft. 9 in. by 13 ft. 5 in. by 9 ft. 9 in. in height.	—	Children of married parents.	Sisters with resident matron.	Supervised by sisters of St. Alban's Mission.
Committee.	—	1s. per child; 1s. 6d. babies in arms.	—	—	Children must have only one parent able to work.	—	To provide food and shelter for children whose one parent has to be out at work all day.
One nursery mistress.	None.	None.	One day-room, one dressing-room.			Managers of the Board School.	In connection with Board School.

District.	Population.	Staple Trade.	Number of Institutions.	Date of Opening.	Capacity.			Maximum Capacity.	Ages at which Taken and Refused.	Hours.	
					Beds.	Cots.	Cradles.			Opened at—	Children Retained until—
'Marie Hilton'—(now at Dr. Barnardo's, 14, Stepney Causeway, E.).		—	—	—	10 and a 'pound.'	35	—	65	Three weeks to five years.	7.30 a.m.	7.30 p.m.
Marylebone—East Street, Manchester Square, W.		—	Two.	1887	1 pound to hold 14 for rest after dinner.	2	11	40 to 50	Three weeks to seven years.	7 a.m.	7 p.m.
Plaistow—St. Mark's.		—	One.	1888	—	4	—	4	One month to three years.	8 a.m.	6 p.m.
Regent Street—Craven Hall.		—	One.	1888	—	—	—	70	One month to fourteen years.	8 a.m.	8 p.m.
Rotherhithe—Union Road.		Leather	One.	1903	—	—	—	—	One month to four years.	8 a.m.	8 p.m. (2 p.m. on Saturdays).
St. John's Wood—96, St. John's Wood Terrace.		—	—	—	—	—	—	—	—	—	—
Southwark—Lancaster Street, S.E. (in connection with St. Alphage's Mission).		—	—	—	—	—	—	—	—	—	—
Tooley Street, S.E.		Leather	One.	1890	—	10	8	18	One month to four years.	7.30 a.m.	8 p.m. (3 p.m. on Saturdays).
Twickenham.		(There	is a	small	crèche	by the	water	side.)			
Tooting—28, Upper Tooting Road; 26, Upper Tooting Road.		—	—	—	—	—	—	—	—	—	—
West London—Craven Hall, Marshall Street, Golden Square, W.		—	—	—	—	—	—	—	One month to eight years.	8 a.m.	8 p.m.
Westminster—Upper Garden Street, S.W.		—	—	—	—	—	—	—	—	8 a.m.	8 p.m.
Whitechapel—Angel Alley, High Street, E.		—	—	—	—	—	—	20	One month to three years.	8 a.m.	8 p.m.

Staff.	Fees. Day.	Fees. Week.	Accommodation.	Cubic Feet of Air per Child when Full.	Qualifications for Admission.	Management.	Remarks.
One matron, six assistant nurses, three servants.	Widows 1d.; 2d. others.	—	Three nurseries.	—	Vaccination. Doctor's certificate to say not suffering and not been exposed to infection.	—	In connection with National Waifs Association, and otherwise known as Dr. Barnardo's Homes, under the management of its Council.
One matron, one head nurse, one assistant nurse, one servant.	4d.	1s. 10d.	One day room, 21 ft. by 14 ft. by 11 ft. in height; one dining-room, 14 ft. by 27 ft. by 11 ft. in height.	—	Children of respectable parents whose mothers go out to work.	Committee of ladies.	Committee of ten persons. Formerly Portman Chapel Day Nursery.
Matron, one head nurse, one servant.	2d.	—	One day room, 15 ft. 6 in. by 12 ft. 3 in. by 14 ft. in height.	—	Both parents obliged to work.	Secretary and matron.	Committee of fifteen persons.
One sister, one head nurse, two assistant nurses, one servant.	4d.	2s.	—	—	—	W. London Mission Committee.	Hon. medical.
Matron, one head nurse, one assistant.	4d.; two same family, 6d.	2s.	Two day rooms, playground.	—	Mothers must be at work.	Committee.	Ladies supervise.
—	—	—	—	—	—	—	No reply.
—	—	—	—	—	—	—	No reply.
Matron, one servant.	2d.	1s.	Day room, play room.	—	Mothers must be out at work.	—	Committee of twenty-five members.
—	—	—	—	—	—	—	For children whose mothers have passed satisfactorily through St. John Baptist's Home. Other children received. Object for elder children from St. John's Nursery. Other children received when there are vacancies on payment of 5s. per week. Licensed for twenty children.
—	4d. per day; half-day, including dinner, 3d.	—	—	—	—	—	Committee of twelve ladies.
—	3d.	—	—	—	—	Committee of George Yard Mission.	

The towns, the staple industries of which, it will be seen, are varied, aggregate to a total population of 7,610,812. To work out what this means in regard to mill- and factory-hand population, and, again, the proportion of this number represented by female labour, and to subdivide this again into married and unmarried and widow labour, would serve no useful purpose, for the fact is so plainly and unhappily apparent that the number of Day Nurseries is wholly disproportionate to the requirements of our great and numerous industrial centres.

Not the least valuable part of this investigation are the remarks made by those ladies and gentlemen who have so kindly furnished me with information far too voluminous for me to lay *in extenso* before the reader. All must agree—and this indeed forms the incentive for the considerable, though wholly inadequate, number of ladies and gentlemen who have devoted so much time and effort to the establishment of these 'Day Nurseries' throughout the length and breadth of the land—that the work, whilst at present being philanthropic, is of immense social and national importance.

Although it is right to say that the system, in most laudatory manner, assists the poor and hard-working mother, yet it has been pointed out to me that there is another class to whom crèches are of inestimable value. For if the position of the work-aday widow is a pitiable one, what of the widower

Interior of a Crèche : teaching Nursing to Children.

suddenly deprived of the help and society of his wife, and left with an infant and young children upon his hands? Is not *his* plight a sad and sorry one? Yet it is a dire strait into which some respectable workman is plunged every day. What if the public-house is found the most ready means of drowning sorrow? What are the courses open to the man who decides to behave affectionately and honourably to his offspring? The answer is that, except where a crèche may exist, there is absolutely no available provision. If in work, he cannot send his children to the workhouse, and if he could, why should they suffer an uncalled-for degradation? Working-men must of necessity follow their work, and this in many cases takes them from town to town, so that even a thoroughly respectable working-man may be reduced to the greatest straits, in that he may not know respectable and suitable neighbours who would be willing to take charge of his children, and hence he must needs place them with strangers, whose interest in them being limited to mere monetary benefit, it is easy to picture the kind of treatment his children are likely to have meted out to them. In such a case a precipitate marriage is the usual solution, entailing further responsibility upon him in regard to the uprearing of another family, and in all probability much unhappiness. On the other hand, there are the cases of wives deserted by their husbands, who, without warning, are called upon to undertake any work they may be

able to find, and if this be factory work, we find them in a similar plight.

Even under normal conditions, when married women or widows have to work in factories, it needs but very little reflection to bring home to us the enormous value, particularly to the children, of properly conducted crèches. With the best intentions upon the part of the mothers, the children, untended by them, must perforce suffer lamentable neglect, not only in regard to the manner of spending their days, but also in regard to proper nourishment. Contrast this with children regularly taken and left at the day nursery. On sanitary grounds, also, the value of the crèche is at once apparent. Let me quote Mrs. Moser, an energetic member of the ladies' committee of the Bradford crèche, for example, who says: 'Each child, on arrival, is stripped and bathed and clothed in garments belonging to the nursery, designed so as to be as light and warm as possible. Each child's own clothing is kept separate, and each has separate towel and hair-brush, their feeding-bottles and teats being numbered and kept quite separate.' 'Then as to nourishment,' the same lady adds, 'the feeding is carried out according to the orders of the honorary medical officer. Humanized milk from the Corporation depot is given, and efforts are made to persuade the parents to continue this at their homes as the regular diet.' It should be mentioned that the Bradford Corporation have very wisely

Silence reigneth in the Crèche.

established a humanized milk depot, and in addition to the infants being fed upon this, the mothers are furnished with all they may require at cost price for use in their own homes. One recoils from a description of the dirt and squalor of a motherless home sheltering uncared-for 'nurse'-children—dirty and ill-fed. On the other hand, it is pleasant enough to contemplate such a picture as the interior of the Hulme crèche at Manchester—which I have taken quite at random, and merely by way of example—a picture of comfort wherein we see the infants snugly ensconced in their capacious bassinettes suspended from the ceiling. It surely requires no word to be added as to the value of such infantile 'homes,' both to the children and to the nation. Were it necessary, perhaps, no more pathetic and forceful endorsement could be cited than the following words taken from a letter of the Rev. L. Spencer Murdoch—the indefatigable secretary who sends me the photograph, and of whom I asked his opinion concerning married women in factories. He says:

'I am delighted to be able to answer your kind inquiries about our crèche. It is managed by a general committee, and receives support from all classes. You will note that the Chorlton Guardians give us a subscription of £5 5s. Though the house where we have the nursery is not very large, and we should like to get one a little larger, still, we feel that it would not do to have it too much like an institution. We want to preserve the "home" character.

'As regards married women working in factories, I may mention one case known to me when I was curate at St. Philip's, Blackburn. A woman told me that she had had three children born, all of whom had died one after another—she having given them out to nurse whilst she went to work. Left with none, she determined to stay at home and nurse what other children came. From that time none died, and she had a healthy little family.'

Inutile to multiply examples, yet it could easily enough be done, for a high rate of industrial infantile mortality is only what is to be expected from the state of things. I have referred to errors of the well-to-do; what is to be expected, in the way of treatment of their offspring, from the unhappy and grossly ignorant? What is to be expected—as Mr. G. B. Young, the hon. secretary of the Glasgow Day Nurseries, informs me—when women say '*We drug our children into quietness*'? What, indeed, is the life of the slum-bred infant which has gin placed to its lips almost as soon as it can drink; the baby arab, its playroom the gutter, its food the most inappropriate, a hard crust washed down with a swill from father's beer-jug? What can the life of such as these be, compared with that of the happy crèche youngsters we see in such pleasing groups, happily and contentedly feeding, the while surrounded by their toys—coveted things they otherwise would not be allowed to make acquaintance with except through the excluding glass of shop

'Happy Crèche Youngsters': Feeding Time.

Costumes in a Yorkshire Crèche: the Outside 'Pound.'

windows? This we see in another of the photographs (Manchester), whilst in another (Bradford) we see on the playroom floor the 'walking-chair,' a valuable contrivance not to be found where most needed.

One can always be reminded when one is in a town in which female factory labour is largely in vogue, by the high percentage of the children suffering from rickets and lads who are 'bandy-legged,' and it saddens one to think that a disfigurement due to want of care in infancy must needs be carried by the operative his whole life through—annoying to reflect that in this way the country is robbed of valuable fighting material.

Another photograph shows us the infantile costumes of the Bradford crèche and the outdoor 'pound,' in which the youngsters tumble and bask in the sun. In visiting some of these miniature institutions, two things struck me as being very thoughtful and useful: the one being the indoor 'pound,' consisting of a box 6 feet or 8 feet square, and having sides about 18 inches high, the whole carefully padded and lined with Turkey red twill, in which the infants can crawl and roll to their heart's content; the other the employment of long, narrow baby-tables about 15 inches in width, the youngsters being seated on one side *only*, so that the nurse, kneeling on a shallow hassock, can conveniently feed them from the *opposite side*—certainly a simpler proceeding than is the case when the nurse stands behind the child.

That all that can be done is done for the comfort and happiness of the little sojourners needs not to be mentioned, when one considers the *constant* supervision and the *kind* of supervision they are under, nor need it be explained how great a boon to the country an extension of the principle would be. All honour to the pioneers to whom is due the labour of inception of this good work and its development up to the present stage. In their opinion, as of all who pause to think, I should imagine, the system needs *great extension*. The work of inception has been by far more difficult than would be the work of extension—as, indeed, is all such work intended for the welfare of the poor and ignorant, because of the innate distrustfulness of that class. The complaint is general that at first the boon was not appreciated. 'Only a small number of children were brought for the first few years,' writes one of the organizers, 'as the working-women did not take kindly to the idea, and the average attendance was not more than twelve.' This is repeated and again repeated, but, happily, the remark that '*the nurseries now require extension*' is equally general. The same authority, continuing, states that 'for several years now the nursery has been kept full, and many names are on the books waiting for admission.' In similar terms write many others. This appears to be the state of things all round, although, it may be interesting to mention, the crèche has been found to act as a reliable barometer

of the prosperity of a town, for invariably upon a fall in industry there is a fall in the number of children sent in, indicating that the mother is at home and, *par suite*, out of work. The question should therefore receive very careful consideration as to the best method of extension.

Up to the present the matter may be looked upon as a charity, seeing that all necessary funds, both for foundation and maintenance, have been provided by the founders and the maintaining committees, augmented from extraneous voluntary sources. But it is a charity of the very best form, inasmuch as it is partially self-supporting. It is charity of the very best form, for by its very *genre* it cannot be abused. True charity, because the most deserving reap its benefits.

Careful circumspection is exercised in regard to admission. On application being made, a visit is paid to the home of the applicant, and if there seems sufficient necessity for the mother to go to work, the child is admitted as vacancies occur. If the mother could remain at home and tend the child herself, she is urged to do so. In many cases nurses are sent to the mothers, and instruction given to them in regard to the rearing of their children. In the opinion of those competent to judge, a tenfold increase should at once be made. Take the case of that huge hive of industry, Glasgow. Mr. George B. Young, the hon. secretary of the society under whose auspices five crèches are at present main-

tained, gives it as his opinion that one-half of the running expenses should be forthcoming from the rates if—as he puts it—'they are to reach *one-tenth part* of the mischief existing: neglected children, starved by either poor or dissipated parents.' Glasgow is a vast industrial centre—'the second city of the kingdom'—and this expression of opinion from one in intimate touch with the conditions is of value; I am indebted to Mr. Young for this and much correspondence and assistance, whilst the establishments are greatly indebted to Mrs. Gale for her energetic solicitude. All must agree that, in a matter of national importance, it is unfair that a few coteries of generous workers should be responsible for so much.

A mode which at once presents itself to the mind is that 'day nurseries' should be municipalized. This, however, I feel should be entered upon with the greatest caution. Take away the efficient and kindly supervision, the generous solicitude and the moral and elevating influence our crèches now impart alike to mothers and to children who have been partially reared in them, and we should detract vastly from their value. Sir Samuel Johnson, the veteran Town Clerk of industrious Nottingham gives me his opinion that the system would best remain much as it is at present, with the modification that corporations should be allowed to contribute to the funds requisite. But this, as I understand from him, the law, in its present form,

will not allow. If I might venture an opinion in this relation, I would unhesitatingly say—*seeing that the matter of the preservation of the physique of our workers is of paramount national importance*—the whole amount of the deficit should be borne municipally. I should say this even were the amount *considerable*, whereas it is but *insignificant*. We are concerned, it must be kept in mind, only with the *deficit*. Now, the amount of deficit, if the establishments were run upon a larger scale, would be, proportionately, greatly reduced—indeed, it might be brought almost to *zero*. Run upon so moderate a scale, such establishments are, proportionately, expensive in working. One thing is sufficiently obvious, namely, at the present moment the conditions are most unfair. We have a number of ladies and gentlemen voluntarily doing a good work—a work of both national and civic benefit; yet a portion of the money expended by these ladies and gentlemen, in reinforcement of their own good efforts, represents a profit payment to the city, since the rates and taxes, paid out of the voluntarily contributed sums, pass into the civic exchequer. Nor is this all! Other payments have to be made which also find their way back to the city exchequer. Gas, water, and electric lighting—all necessaries for day nurseries—are in many cases supplied by the municipality; hence here again we find the city reaping a financial profit out of a charity working for urban benefit.

Having, by the courtesy of the respective hon. secretaries, been furnished with figures relating to the maintenance of day nurseries, I feel, in order to substantiate the views I have advanced, and for the guidance of others desiring to extend this beneficent work, it will be advisable to refer to the running costs of crèches. Comparison is rendered a little difficult by the diverse modes of keeping the accounts, and I have found the features can be best presented by taking the average of nine crèches as typical of the system.

In the matter of obtaining improvement in general physique during the infantile stage, it is obvious the factor of paramount importance is efficiency in nutrition. Now, in this regard it is interesting to point out that the cost incurred in feeding a large number of children attending day nurseries and contributing the moderate payments shown in the tables was practically *nil.* In other words, the establishments proved to all intents and purposes self-supporting in regard to nutrition. Thus:

	£	s.	d.
Total food bill	1,064	11	5
Total of pence received	1,060	7	6½
Deficit	4	3	10½

Now, if we commence to analyze the items of expenditure, we at once detect the one militating most against a satisfactory balance at the year's

end. It is that of 'salaries.' These, as will be seen by the items appended, amount in round figures to the total cost of nutrition :

	£	s.	d.
Rent and taxes	510	2	1½
Coal and gas	215	8	1
Stationery and office expenses ...	114	9	2
Salaries	942	8	2
	1,782	7	6½

To the actual food bill has to be added certain sundries'; thus :

	£	s.	d.
Actual food bill	1,064	11	5·
Sundries...	110	14	9½
	1,175	6	2½

Thus the total housekeeping expenses amount to £2,957 13s. 9d. From this we see at once that a material extension of the system would be productive of material economy. For certain items, notably that of salaries—indeed, most of them—would not, it is obvious, rise in anything like *pro rata* proportion with the increment in attendances, whilst the latter would result in an increase of revenue directly proportionate.

These figures give gross income and expenses ; it is, perhaps, still more instructive to compare the proportional expenditure per child.

ANALYSIS OF A GROSS EXPENDITURE OF £2,957 13s. 9d., WITH RECEIPTS DERIVED FROM 89,432 ATTENDANCES.

Expenditure per Child per Day other than for Nutrition.

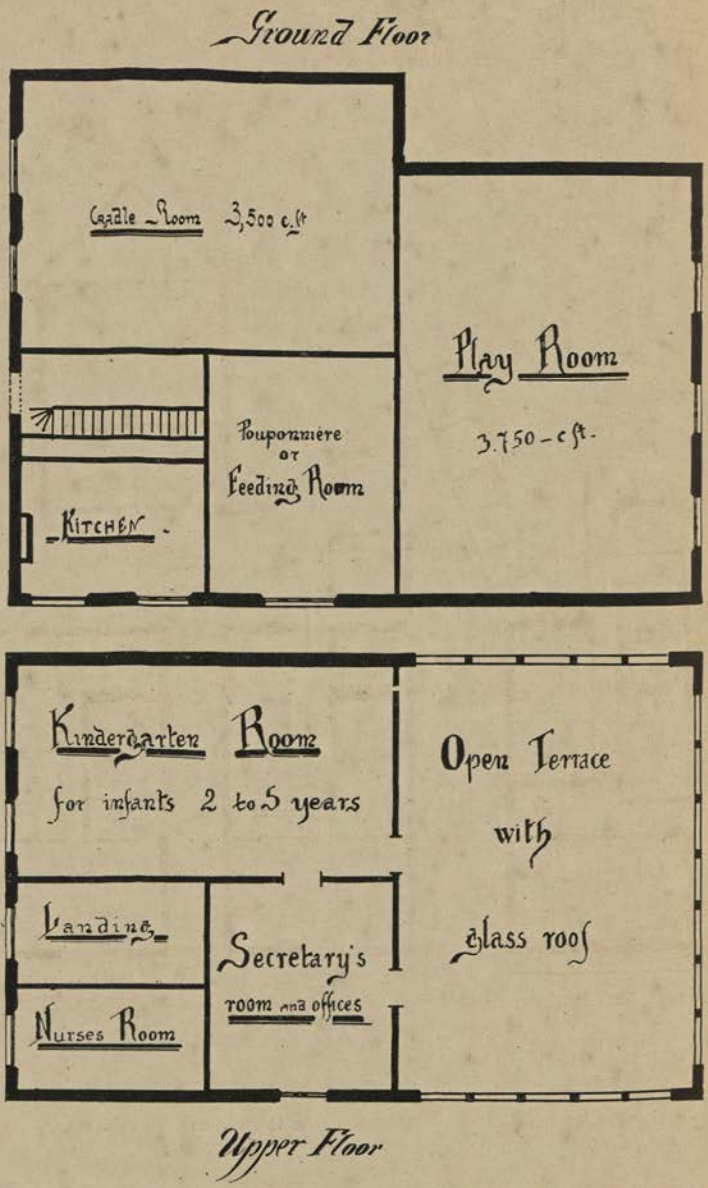
	Pence per Head.
Rent, rates, and taxes	1·36
Coal and gas	0·57
Stationery and office expenses	0·30
Salaries	2·53
	4·76

Expenditure per Child per Day for Nutrition only.

	Pence per Head.
Housekeeping	2·85
Sundries	0·29
	3·14

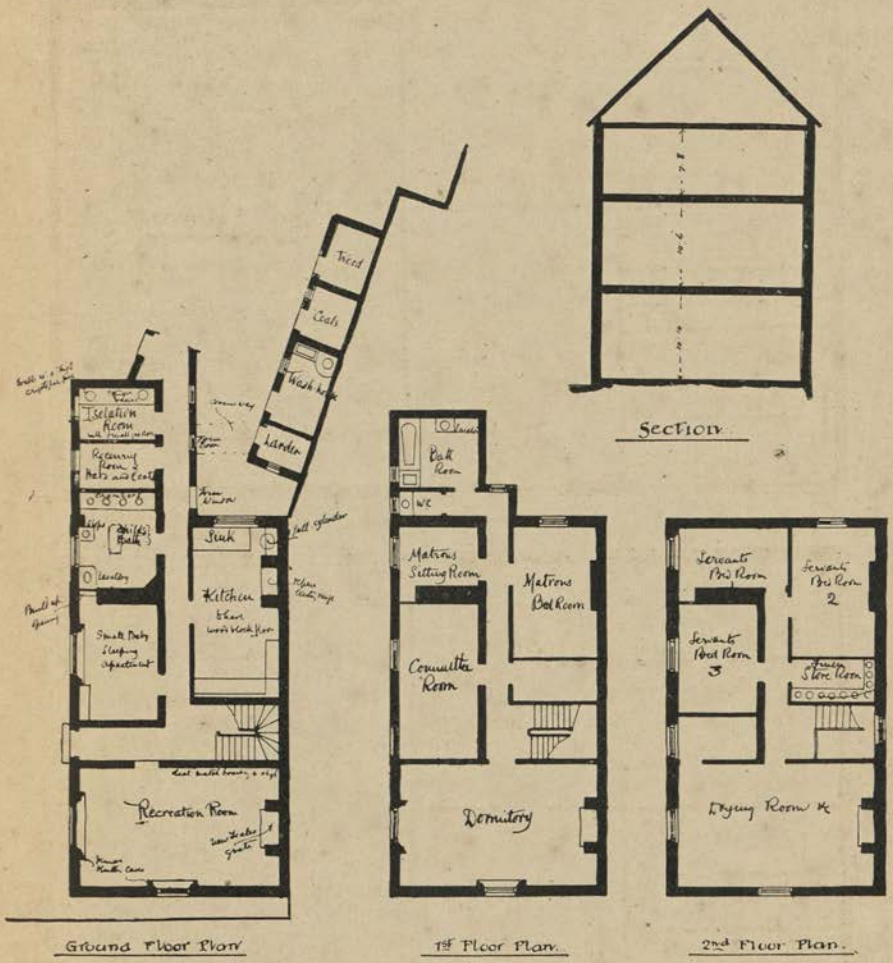
Grand total of expenditure per head, 7·90.

Thus we see that the running expenses, exclusive of nutrition, amount to 1·62 penny per child in excess of the actual cost of feeding it. Moreover, that whereas the average receipt per child of 2·83d. is practically sufficient to defray the cost of nutrition, it, in actual practice, only has the effect of reducing the expenditure per child to 5·07d. per attendance. So that, as a result, the pence contributed averages out to little more than one-third of the cost of maintenance.



Plan showing Convenient Arrangement of a Crèche for 50 Infants and 50 Children.

Approximate cost of building, exclusive of land, £1,000. Furniture, cots, cupboards, etc., about £200.



Plans and Details of the Princess Christian Crèche at Windsor.

With proper management and supervision—which in the case of crèches, as now carried on, is assured, and this gratuitously—it invariably happens that a work can be carried on on a large scale far more effectively and economically than on a small one.

That our present crèche system is placed at serious disadvantage by reason of the smallness of the scale upon which it is carried out is patent to all inquirers. Those conversant with its working are, moreover, unanimous as to the importance and need for such extension, and hence it is a matter demanding every consideration.

In adverting to the splendid work now being entered upon—with the hearty and energetic co-operation of His Majesty—for combating the devastation wrought by consumption, I have ventured to point out that measures having for their object the arrest of further degeneration of our national physique are even of greater importance. For the sad fact must be ever borne in mind that, *pari passu* with the lamentable increase in phthisis, we have now to face an alarming degree of degeneracy in regard to the physique of our workers. That such *is* the case is altogether beyond the pale of dispute —the heavy increase in the refusal percentage in our recruiting alone most ominously proving this. That such degeneration is to be attributed principally to the evil effects of our great industrial centres is also beyond discussion. In a paper upon the subject written by Mr. Ralph Neville, K.C.

(chairman of the Garden City Association), it is pointed out that whilst, for example, the workers in our great Lancashire towns are 'stunted, pale-faced, thin-limbed, with teeth decayed in the case of young and old alike, presenting the most melancholy spectacle to one's eyes,' yet the workers in the agricultural districts of the same county present a diametrically opposite appearance. 'A finer race,' he continues, 'I have never seen—tall, big-boned, long-limbed, and muscular, I doubt if Europe could produce their match.' And what is here said of Lancashire, unhappily, holds good in regard to Yorkshire (Sheffield, to wit), Staffordshire, and other of our counties comprising within them huge manufacturing centres!

It is therefore abundantly clear that to arrest further decay in physique, we must attack the problem through the children, and not through the decrepit. In this relation I am persuaded no better course could be pursued than an extension of that which has already been so well begun—I refer to extension of the Crèche System. Any opinions of my own would be of little moment; but I think it nothing more than my bounden duty to mention the views of others—so competent to express them—views which have come to my knowledge during my investigations into this important subject, at this moment little more than in its embryonic stage.

In regard to the care of children whose mothers are employed in mills and factories, there are ob-

viously two courses open—a drastic one and a moderate one—the former being the prohibition of such labour, the latter the municipalizing of crèches. The matter is clearly debatable, both propositions having their advantages and disadvantages. Nevertheless, were my views of any weight, I would counsel recourse to neither, for the reason that in either case we should be, as wilfully as unnecessarily, casting aside a moral influence of immense—nay! untold—prepollence. 'The hand that rocks the cradle rules the world' is indeed a sentiment of noble truth. In this case the mind—the gentle and benign influence—of noble women could, and would, accomplish more than all the laws and enactments ever made or to be made. If I might venture a suggestion, it would be again a beneficial compromise, namely, that the good work should be continued as begun, with the important modification that all financial responsibility be lifted from the shoulders of the pioneers and transferred to more sturdy ones—the rates.

Let me hasten to put at the disposal of such of my readers as may feel disposed to join the little army—already so pleasantly and so unmilitantly working—the views of eminent divines. Men such as these should be in an eminently advantageous position to judge of the merits of the system, as well as to form an opinion upon the relative merits of prohibition of married female labour in factories by legislative enactment and of the effects of municipalization.

I will commence with one having a leaning towards prohibition. That indomitable labourer and well-wisher to all, the Bishop of Ripon, writes thus:

'THE PALACE, RIPON,
'*November* 1, 1903.

'MY DEAR SIR,

'You will, I know, forgive a busy man's delay in replying to your letter. I am making inquiries about the provision in Leeds, and will let you know the result. I have, moreover, been so incessantly occupied with other pressing matters that I have been delayed in carrying out your wish.

'I am glad that you are adding your weight and influence in this matter. I feel that all that lies in our power must be done to insure the vigour of the population. Personally I would like to see a very great diminution of the labour of married women. It appears to me to be a defect in national policy and intelligence that so much of it should remain. The laundry work I hear everywhere described as operating injuriously.

'With grateful thanks for your paper, and with all cordial sympathy,

(Signed) 'W. B. RIPON.

'P.S.—I have read your paper with the deepest interest. If half the good you show to be possible could be attained, how much would national happiness and health be advanced!'

Surely the patriot does not breathe who could disagree with a single word contained in this letter; surely both the truth and solemnity must come home to us all of those words, 'All that lies in our power *must* be done to insure the vigour of the population.'

To reproduce the letter of the Primate will be to render nugatory, as well as unnecessary, any remarks concerning the advisability of legislative prohibition, his clearly set-out position of affairs being wholly unassailable:

'OLD PALACE, CANTERBURY,
'*December* 5, 1903.

'DEAR SIR,

'I am directed by the Archbishop of Canterbury to thank you for your letter of November 3 and the proof of your interesting paper on "Garden Cities."

'With regard to the question of married women as operatives in factory labour, His Grace sees great difficulty as to prohibiting such work by legislation. His Grace is fully conscious of the disadvantages and evils attending such work, yet he feels that the prohibition of it might be attended by still greater evils. Women *will* work in factories, and any restriction in the way of marriage would often lead to immorality by way of evading the law. Moreover, His Grace feels that such legislation would be too much in advance of *present* public opinion to make it practicable.

'The Archbishop is greatly interested in this matter, and will be glad to hear when anything is going forward.

'I am,
'Yours faithfully,
(Signed) 'C. PENDOCH BANKS.'

A broad view and a careful study are essentials in this relation, and I venture to think the good Bishop who so courteously sends me the following—containing a sentiment characteristic of his kindly feeling—will, on further study of the question, find himself in perfect accord with the Primate:

'BISHOPGARTH, WAKEFIELD,
'*December* 6, 1903.

'MY DEAR SIR,

'The Bishop of Wakefield desires me to say that he has ever made any special inquiries into the conditions of labour in Halifax and Huddersfield, but he is thankful to say that it was ascertained recently by a private inquiry that in Wakefield hardly any mothers or young children are employed in mills. The Bishop has not had the opportunity of studying very thoroughly the crèche question, but has always been inclined to dread the introduction of anything that would make it easier for mothers to leave* their young children, and thinks a resolute effort to alter the conditions which make such labour possible a vastly better plan.

'Yours truly,

(Signed) 'C. N. HONE (*Chaplain*).'

The view of the Primate, it will be observed, is endorsed by that of the Bishop of London, than whom probably no one is more perfectly acquainted with socio-industrial problems :

'LONDON HOUSE,
'32, ST. JAMES'S SQUARE, S.W.
'*November* 5, 1903.

'DEAR SIR,

'The Bishop of London desires me to thank you for your letter and enclosure, which he will read with much interest. I am to say that his lordship is always in favour of minimizing the employment of married women in factories, but that he doubts if it is a matter for legislation.

'I am, yours truly,

(Signed) 'K. G. AVERILL.'

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* It may be advisable to point out—albeit a perusal of the accompanying tables may have acquainted the reader with the fact—that there does not exist a single crèche in the kingdom in which, under normal circumstances, a mother is allowed to leave her child during the night.

Careful thought will, I feel, lead my readers to endorse the view of the Primate that the prohibition of female factory labour 'might be attended by still greater evils'; therefore the point to be weighed is whether it would be advisable to municipalize day nurseries, or to empower the municipalities to contribute to them. In my opinion the latter course—for reasons I have given—would be preferable. This view appears to be the one taken by the Bishop of Liverpool, as we see by the following:

'THE PALACE,
'19, ABERCROMBY SQUARE,
'LIVERPOOL,
'*January* 26, 1904.

'DEAR SIR,

'In answer to your letter of yesterday's date, the Bishop of Liverpool says the subject is one on which he cannot speak with any amount of experience; but he should think it would not be advisable at present to municipalize crèches, as that would be likely to encourage mothers who could remain at home to lay the responsibility of caring for their children during the day on the municipality. At the same time, he should think that in many poor neighbourhoods it was desirable that voluntary effort should be strengthened by grants from the rates.

'Yours faithfully,
'T. ALLISON (*Chaplain*).

'A. R. SENNETT, ESQ.'

The question, however, is one largely of administration and supervision. The latter important factor, careful reflection will show, is very unlikely to gain in efficiency by municipalization unless such municipalization should perpetuate the present

splendid effect of unpaid and heart-prompted supervision and solicitude. If, however, this could be assured, there are not wanting advocates in high places for the municipalization of crèches.

The Bishop of Rochester, within whose diocese fall some of the densest industrially populated districts of South London, was so kind as to favour me by instituting some inquiries in these districts. The result, it will be seen from his letter, was in favour of municipalization, the point to which I have referred being carefully kept in mind:

'BISHOP'S HOUSE,
'KENNINGTON PARK, S.E.,
'*February* 16, 1904.

'DEAR SIR,

'I have made some little inquiry about municipal crèches. The results are all favourable to such a plan. Of course, they include the suggestion that care will be needed in investigating cases, and preventing abuse by a wrong class of people who ought not to need them.

'Yours very truly,
'E. ROFFEN.

'A. R. SENNETT, ESQ.'

To sum up, the result of my investigation of this important subject justifies me in saying that the view is universally expressed that a great extension of the crèche system throughout Great Britain is urgently called for, and that, whilst opinions differ as to the advisability of municipalization, there exists absolute unanimity in regard to the need and propriety of day nurseries being assisted out of the rates.

The only evidence of municipal facility that has come to my notice is that contained in the following passage from the reply received from the Town Clerk of Edinburgh, who says: 'The Corporation have two small apartments in connection with their establishments of public washhouses in the city which are set apart for the accommodation of children. There is no charge made, and the Corporation provide the furnishings and pay the attendants a small weekly wage.' And, again, I learn from Dr. McCleary, Medical Officer of Health for Battersea—whom I found also compiling statistics in regard to this subject—'that at the Nine Elms Baths and Washhouses of the Battersea Borough Council there is a room which is used by the children whose mothers are engaged in the washhouses.'

With regard to municipal aid, I am aware of nothing in this direction beyond the monetary assistance rendered by the Chorlton Guardians, to which reference has been made; but seeing that I have ventured most strongly to urge this, I felt it incumbent upon me to inquire into the legal aspect.

The importance of the matter would, I thought, even warrant me in troubling the highest legal authority in the kingdom. The Lord Chief Justice of England, it is well known, sets a very high value upon bodily physique. Himself an athlete, he combines extraordinary mental powers with exceeding urbanity and kindness of heart, and hence was so

good as to take much trouble before giving his opinion. It is contained in the following letter:

'HORNTON LODGE,
'KENSINGTON,
'*January* 29, 1904.

'DEAR MR. SENNETT,

'I am in receipt of your further letter, with enclosure. It seems to me that statutory powers would be required to enable the municipality to contribute to the scheme suggested in your letter.

'Yours faithfully,
(Signed) 'ALVERSTONE.'

From this it will be seen that to carry the idea—and much-needed extension—into effect it will be necessary to pass a short Act of Parliament; this is a matter, however, which should occasion but little difficulty, for such a measure, whilst empowering, would carry with it the advantage of local option, and nothing in the nature of compulsion. It is therefore to be hoped that one of our legislators will present a Bill for this purpose, in order that the philanthropic work at present being carried on in regard to the establishment and maintenance of crèches throughout the kingdom may be appropriately assisted, and the good work consistently extended.

Amongst the whole of a voluminous correspondence, it is gratifying to find a consensus of opinion in regard to the value of the crèche. Thus the Bishop of Peterborough writes: 'The question that

Infant Waifs in Dr. Barnardo's Home, London.

you raise is a very large one. I should be very glad to hear that this work of caring for children whilst the mothers are at work in mills and factories was being duly carried out in *all centres* of population where it is required.' Again turning to Ireland, we have the opinion of the Rev. Canon Fricker, who has under his supervision the crèches of Dublin, a city able to boast no less than three. 'The crèche is one of the most useful works of charity that I know of,' he writes, 'and a charity that all seem to take an interest in. It would be a great matter if they were much more numerous, and in anything I can do to help you I will be only too glad to assist.'

With these remarks anent a subject in connection with which a man feels himself so powerless, I crave leave to commend the matter to the gentle, though may I hope energetic, care of the women of Great Britain.*

* I beg, moreover, sincerely to thank the Lady Mayoresses and other ladies, the town clerks, ministers of religion, as well as the members of committees, for their kindly assistance, also the hon. treasurers and hon. secretaries who have kindly placed their reports and balance-sheets at my disposal.

APPENDIX TO VOL. I.

MORTALITY IN ENGLAND AND WALES.

A CAREFUL examination of the figures published by the Registrar-General for the last sixty years yields some interesting data regarding the rate of mortality in this country. It will first be seen—Table A—that in this period the population has nearly doubled itself; it will also be noticed that the number of females has always been in excess of the number of males, but that the proportion between them remains fairly constant.

In Table B we have the marriage-rate, birth-rate, and death-rate set out per 1,000 inhabitants for periods of ten years. From this it will be gathered that the marriage-rate increased from 1841 to 1870, but then decreased, especially between 1881 and 1890, when it reached a very low figure. The birth-rate increased for forty years, but during the last twenty years has dwindled badly.

In the case of the death-rate, a marked decrease has taken place in each decade, so that it now stands at its lowest figure. This decrease in the death-rate is about equal in the case of both males and females. For comparison there is appended to the Table the mean rates for the whole period, 1838 to 1900, over which the returns extend.

Table C gives the death-rate per 1,000 during the year 1900 for twelve different groups of ages. From this it will be seen that from five years until thirty-five years of age the probability of dying is small compared with other periods of life; that from thirty-five to sixty-five it increases greatly, especially with men; whilst at sixty-five the probability becomes equal to the first five years of life. After sixty-five the death-rate becomes very high.

Table D shows variations of the death-rate in all parts of

England and Wales. For this purpose the population of each county, as returned in the census of 1901, is compared with the death-rate as returned for the year ending December 31, 1900. The populations would vary slightly from those on which the rates were calculated, but for comparison the variation is so small that it can be neglected.

We at once see the effect of overcrowded towns on the death-rate as compared with purely rural districts. We may compare, for instance, the rural portions of Kent, Surrey, and Middlesex with the death-rate of London. Again, in the south-eastern, south midland, and south-western districts, all comprising large tracts of agricultural land, we find a death-rate varying from 14·5 to 17·5, but always well below 18·2, the general average for the country. In the west midland district, the first three counties named, largely agricultural, have a low death-rate; but the next one, Staffordshire, with its large population of industrial workers, has at once a high death-rate; and this is also exemplified by the death-rate in Warwickshire.

A very significant fact to note is that Lancashire, a county of manufacturing towns, has the highest death-rate in the country. But perhaps no district better exemplifies this point of increased mortality due to overcrowding in towns than the northern, for here we find three counties with towns and mines with a death-rate above the average; but the one county still remaining mainly agricultural, Westmorland, has the low death-rate of 15·8 per 1,000.

TABLE A.—POPULATION OF ENGLAND AND WALES.

Year.	Males.	Females.	Total.
1851	8,808,662	9,174,187	17,982,849
1861	9,801,152	10,318,162	20,119,314
1871	11,092,620	11,695,974	22,788,594
1881	12,673,435	13,372,707	26,046,142
1891	14,094,785	14,995,426	29,090,211
1900	15,597,307	16,663,706	32,261,013

TABLE B.—SHOWING RATE OF MARRIAGES, BIRTHS, AND DEATHS PER 1,000 INHABITANTS IN ENGLAND AND WALES.

Period.	Marriages.	Births.	Deaths.		
			Male.	Female.	Total.
1841–1850	16·1	32·6	23·1	21·6	22·4
1851–1860	16·9	34·1	23·1	21·4	22·2
1861–1870	16·6	35·2	23·7	21·4	22·5
1871–1880	16·2	35·4	22·7	20·1	21·4
1881–1890	14·9	32·5	20·3	18·1	19·1
1891–1900	15·6	29·9	19·3	17·1	18·2
Average from 1838–1900	16·0	33·2	22·1	20·0	21·0

TABLE C.—SHOWING THE DEATH-RATE AT TWELVE GROUPS OF AGES DURING THE YEAR 1900.

	0.	5.	10.	15.	20.	25.	35.	45.	55.	65.	75.	85.	All Ages.
Males ...	58·0	3·9	2·2	3·7	5·4	7·1	12·5	20·8	38·9	71·4	155·8	301·4	19·5
Females	48·3	3·9	2·3	3·3	4·4	6·1	9·9	15·6	30·7	61·8	142·3	270·6	17·0
All persons	53·1	3·9	2·2	3·5	4·8	6·6	11·1	18·1	34·5	66·1	148·4	282·0	18·2

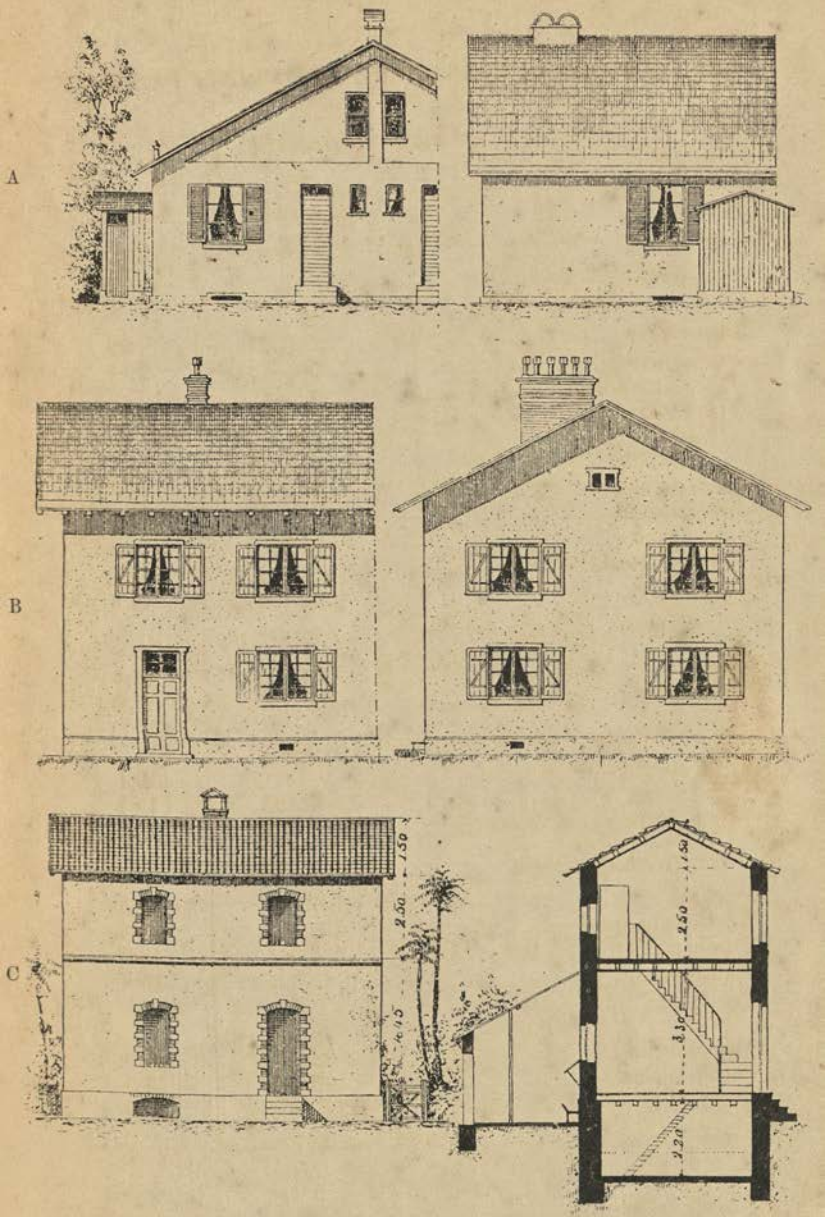
TABLE D.—SHOWING POPULATION AND DEATH-RATE IN VARIOUS DISTRICTS IN ENGLAND AND WALES IN 1900.

Districts.	Population.	Death-rate.
England and Wales ...	32,526,075	18·2
London	4,536,063	18·7
South-Eastern District.		
Surrey*	2,008,923	14·6
Kent*	1,351,849	16·0
Sussex	605,052	15·2
Hampshire	798,756	16·7
Berkshire	254,931	15·3
South-Midland District.		
Middlesex*	3,585,139	14·5
Hertfordshire	250,350	15·9
Buckinghamshire	195,534	15·2
Oxfordshire	182,768	15·9
Northamptonshire	338,064	15·0
Huntingdonshire	57,773	16·0
Bedfordshire	171,249	15·0
Cambridgeshire	190,687	15·9
Eastern District.		
Essex	1,085,576	16·3
Suffolk	384,198	17·0
Norfolk	460,040	17·8
South-Western District.		
Wiltshire	273,845	14·8
Dorsetshire	202,962	14·8
Devonshire	660,444	17·5
Cornwall	322,957	16·6
Somersetshire	508,104	16·0
West-Midland District.		
Gloucestershire	634,666	16·0
Herefordshire	114,401	16·9

*. The population figures include the London area situated in these counties, but the death-rate is that of the part of the county outside the London area.

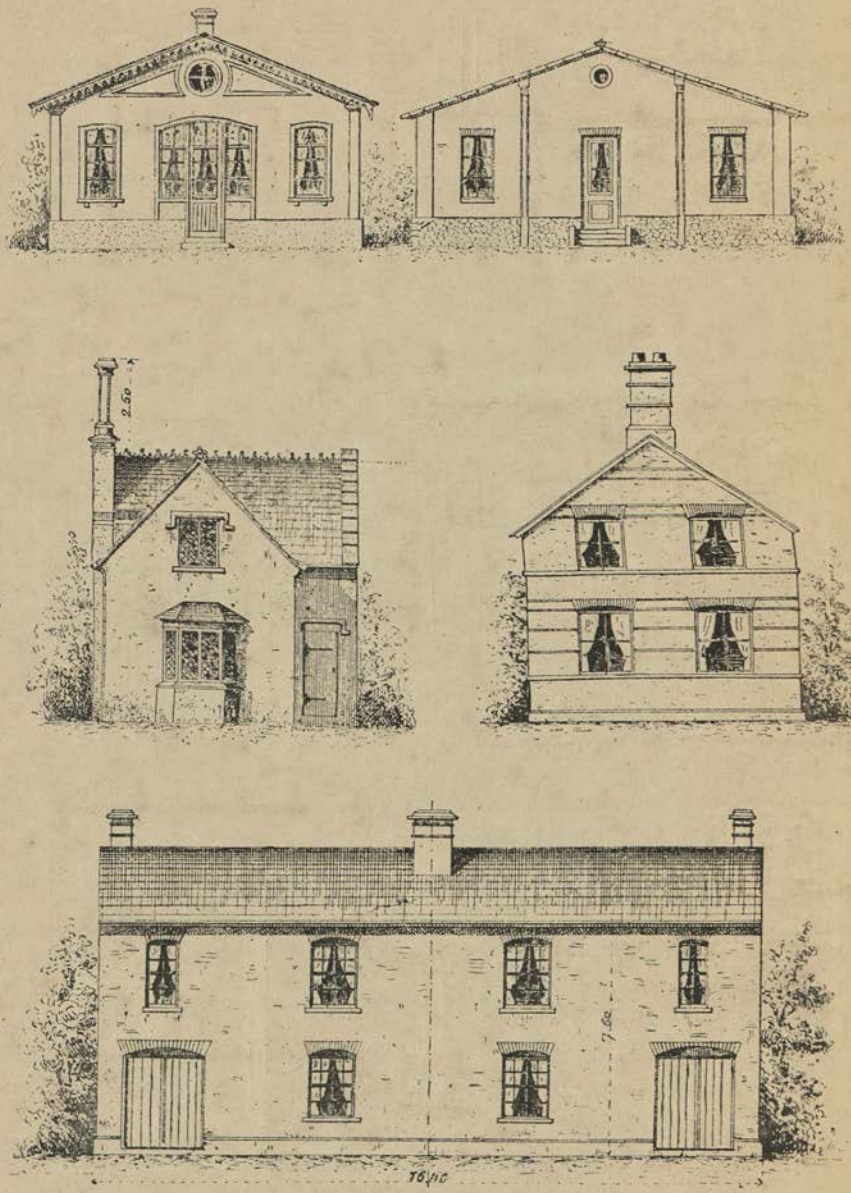
TABLE D.—*continued.*

Districts.	Population.	Death-rate.
West-Midland District —continued.		
Shropshire	239,321	16·9
Staffordshire	1,234,382	20·5
Worcestershire	488,401	17·2
Warwickshire	897,678	19·6
North-Midland District.		
Leicestershire	433,994	17·5
Rutlandshire	19,708	13·7
Lincolnshire	498,781	16·9
Nottinghamshire	514,537	18·4
Derbyshire	620,196	17·2
North-Western District.		
Cheshire	814,555	17·6
Lancashire	4,406,787	21·3
Yorkshire District.		
West Riding East Riding North Riding	3,585,122	19·1 19·1 19·8
Northern District.		
Durham	1,187,324	19·3
Northumberland	602,859	19·4
Cumberland	266,921	18·3
Westmorland	64,305	15·8
Wales.		
Monmouthshire	292,327	18·8
South Wales	493,107	18·5
North Wales	1,227,502	18·6



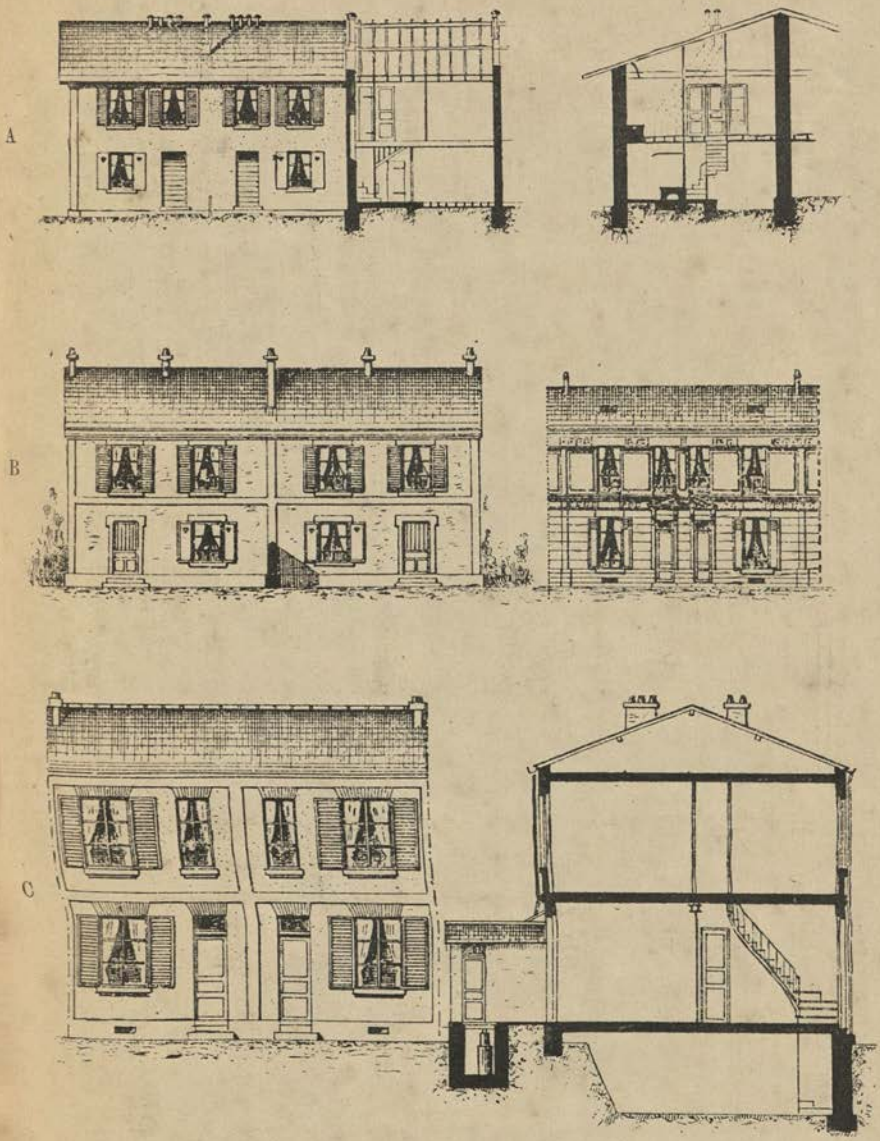
Industrial Dwellings of Different Nations.

A, Cottage at Mulhouse ; B, House for four families at Marburg ; C, Village house at Azeb-Zamoum, Algeria.



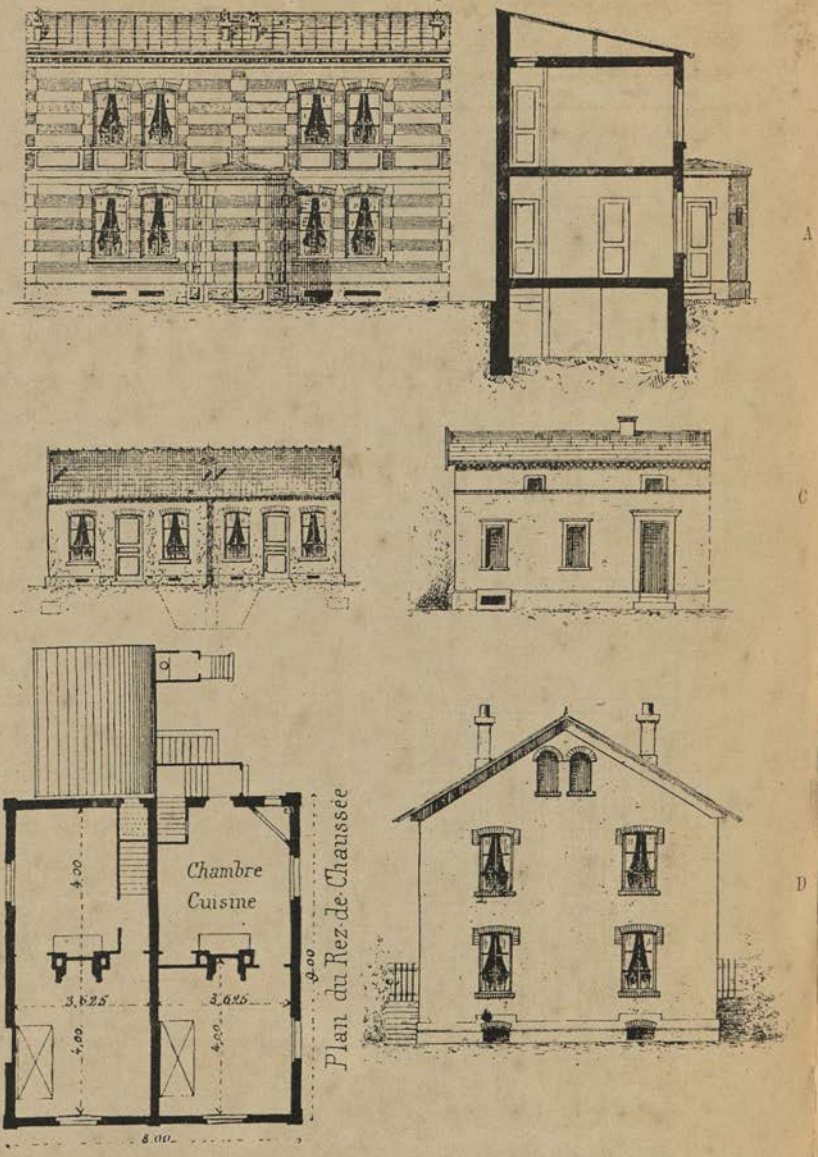
Industrial Dwellings of Different Nations.

A, Cottages at Bolbec ; B, English Cottage ; C, English cottage ; D, Grouped dwelling for four families (Metropolitan Assoc.).



Industrial Dwellings of Different Nations.

A, Workmen's cottages at Mulhouse ; B, Workmen's houses of Mr. E. Cacheux, at Lilas (Seine) ; C, Workmen's houses of Mr. E. Cacheux, Bd. Kellermann.

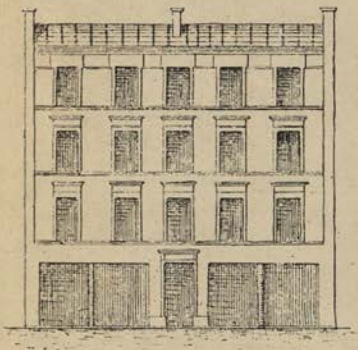


Industrial Dwellings of Different Nations.

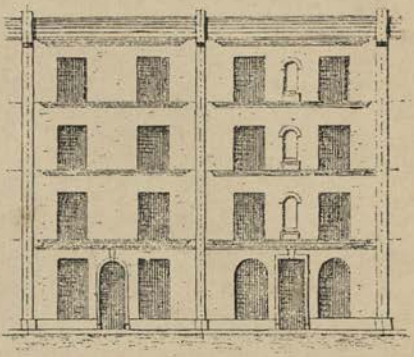
A, Type of flats of the Boileau group, erected by the Société de Passy, Auteuil ; B, Cottages of the Boileau group, erected by the Workmen's Dwellings Society of Passy, Auteuil ; C, Farm labourer's cottage of Baron de Behr (Prussia); D, Dwellings at Noisiel ; E, Ground-floor plan of dwellings at Noisiel.

A

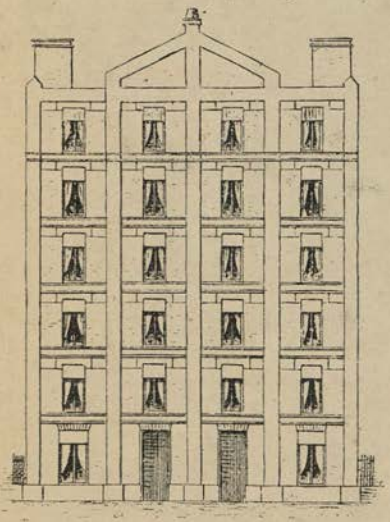
B



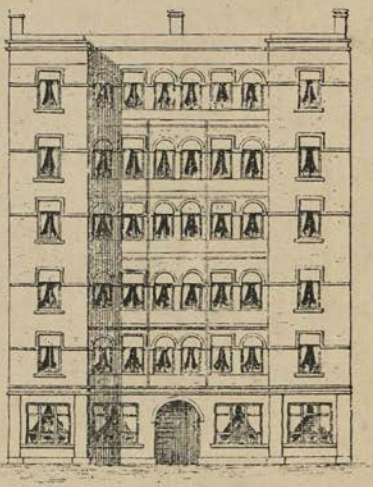
C



D



E

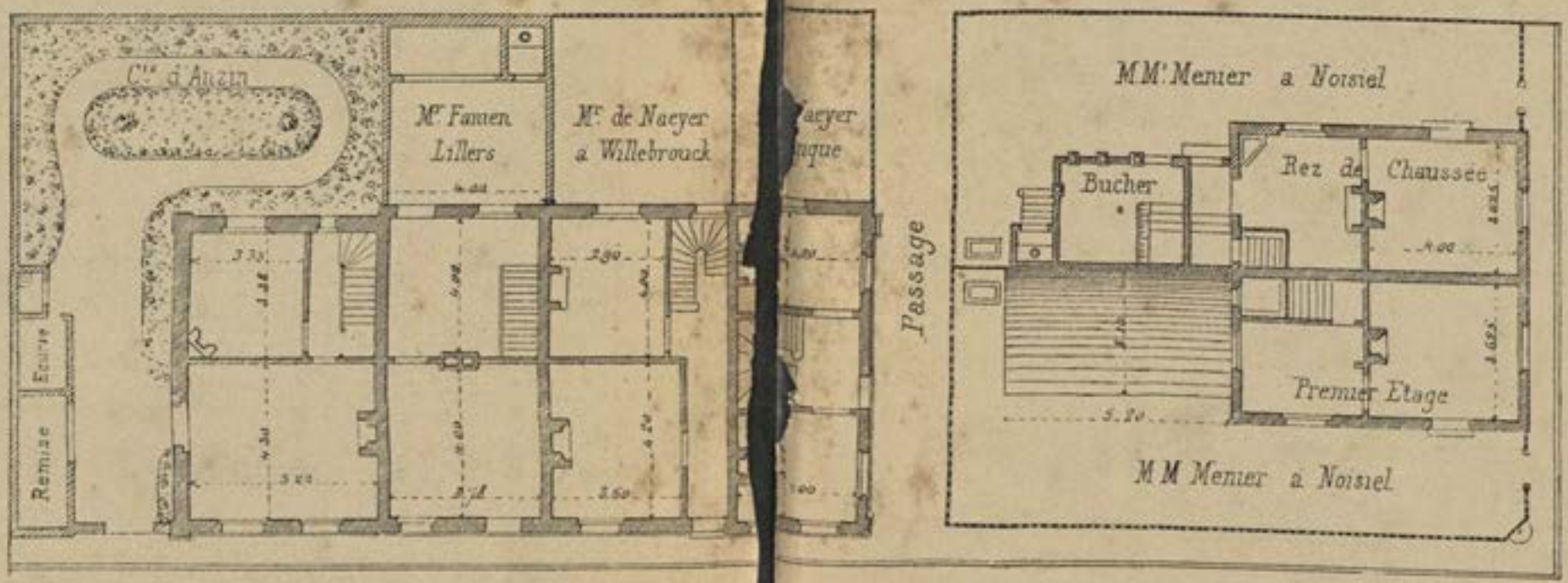


F

Industrial Dwellings of Different Nations.

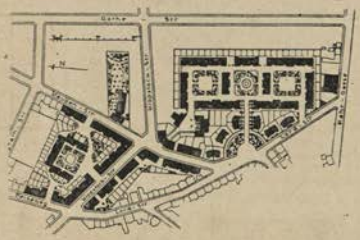
A, Three family group dwellings at the Altstaden Mines, near Oberhausen; B, Industrial flats erected at 65, Bd. Grenelle, by the *Association Philanthropique;* C, Industrial flats of Mr. de Madre; D, Industrial flats of Mr. Puteau; E, Industrial flats in Scotland; F, Industrial flats in New York (copied on those erected in London by the Improved Dwellings Company).

Plan du Rez-de-Chaussée à 0.005 pour metre



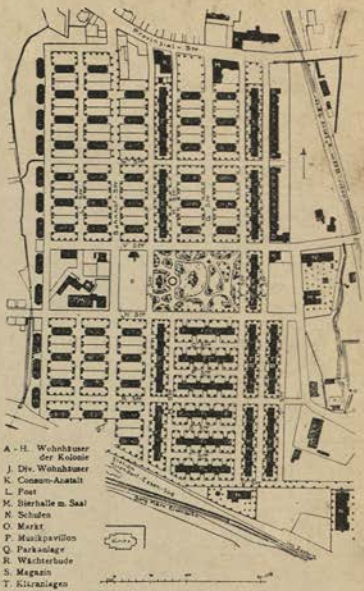
RUE DES HABITATIONS OUVRIÈRES.

A Street of Workmen's Dwellings suggested by a French Architect.



I–VI und A–E Wohnhäuser der Kolonie
VII–XVI Projekt desgl.
F. Projektirte Badeanstalt mit Lesehalle
G. Consum-Anstalt
H. Bierhalle mit Gartenwirthschaft

A



A–H. Wohnhäuser der Kolonie
J. Div. Wohnhäuser
K. Consum-Anstalt
L. Post
M. Bierhalle m. Saal
N. Schulen
O. Markt
P. Musikpavillon
Q. Parkanlage
R. Wächterbude
S. Magazin
T. Kleranlagen

B

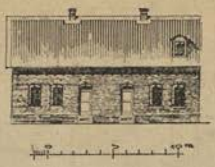
I–XI. Wohnhäuser der Kolonie
A. Evangelische Kapelle
B. Katholische Kapelle
C. Erholungshaus
D. Kesselhaus
E. Pförtnerhäuser
F. Feuerwehr-Depot u. Gärtner-Wohnung
G. Kornspeicherei
H. Consum-Anstalt

C

D

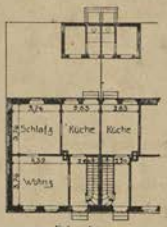
Plans of Colonies in Herr Krupp's Model Town at Essen.

A. Friedrichshof Colony ; B, Cronenberg Colony ; C, Altenhof Colony ; D, Alfredshof Colony.

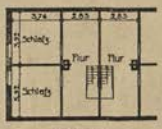


Wohnhaus für 1 Familie

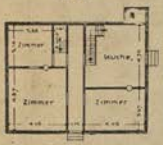
A



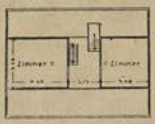
Erdgeschoss



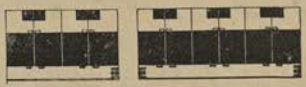
Dachgeschoss



Erdgeschoss

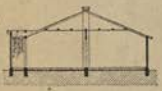


Dachgeschoss



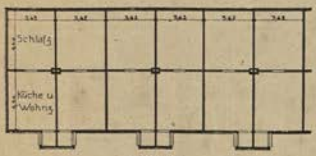
Hügelstrasse

B

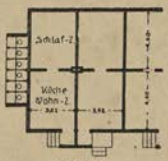


Wohnhäuser
für je 2 Familien

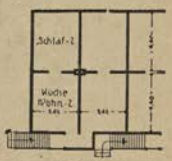
Geschosshöhen im Lichten
Erdgeschoss 2,50 m
Dachgeschoss 2,93 m



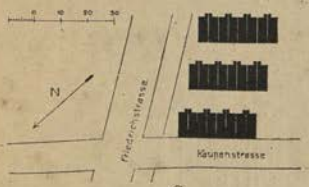
Erdgeschoss



Erdgeschoss

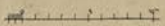


Obergeschoss



C

Wohnhaus für 4 Familien
System D



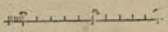
D

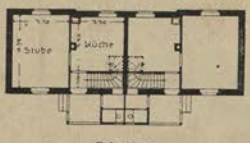
Types of Workmen's Dwellings at Essen.

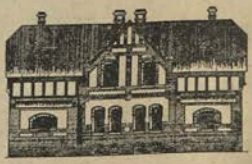
A, House where Herr Krupp was born ; B, Workmen's cottages ; C, Cottages for two families ; D, Block dwellings for four families.

Wohnhaus
für 2 Familien
System III

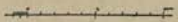
Wohnhaus
für 2 Wittwen
System VI

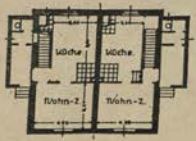


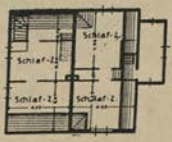




Wohnhaus
für 2 Familien
System D





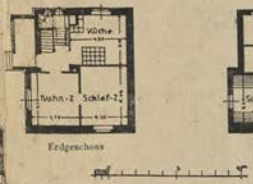


Wohnhaus
für 2 Familien
System A

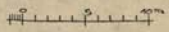
Four Types of Cottages for Two Families at Essen.

A,

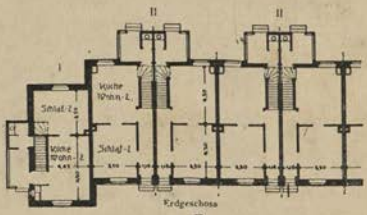
Wohnhaus für 1 Familie
System A II
Geschosshöhen im Lichten 3,14 m



A



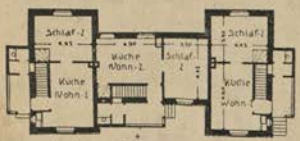
Wohnhäuser
für je 1 Familie
System R
(Siehe auch Seite 38)



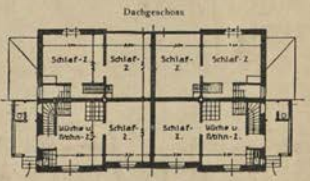
B

Wohnhaus für 3 Familien
System G
Geschosshöhen im Lichten 3,14 m

Wohnhaus für 4 Familien
System E I
Geschosshöhen im Lichten 3,14 m



C



D

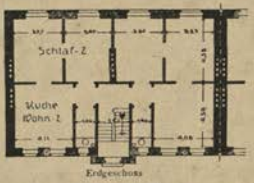
Types of Workmen's Dwellings at Essen.

A, Detached cottages ; B, Block of cottages ; C, Block dwelling for three families ; D, Block dwelling for four families.

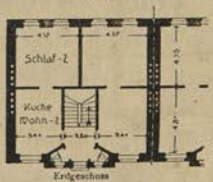
A–G III. Wohnhäuser der Kolonie
H. Diverse Wohnhäuser
J. Consum-Anstalt
K. Feuerwache
L. Spritzenhaus

A

Geschosshöhen im Lichten:
Erd- u. I. Obergeschoss 2,86 m
II. Obergeschoss 2,51 m



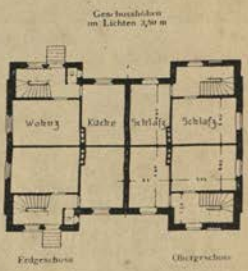
Wohnhaus
für 6 Familien
System B



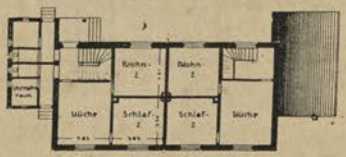
Wohnhaus
für 6 Familien
System C

B

Wohnhaus
für 4 Familien
System B



Wohnhaus für 4 Familien
System E



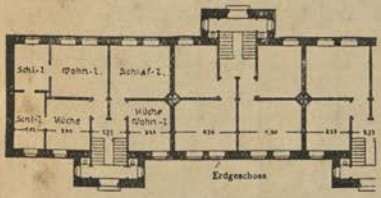
C

D

Blocks of Workmen's Dwellings at Essen.

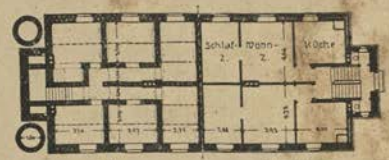
A, Baumhof Colony; B, Block dwelling for six families; C, Block dwelling for four families; D, Block dwelling for four families.

Wohnhäuser für je 6 Familien
System F
Geschosshöhen im Lichten 3,15 m

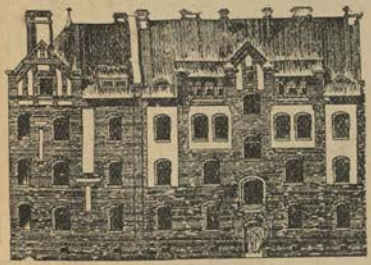


A

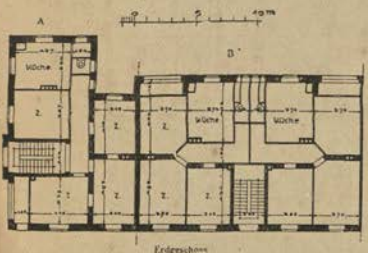
Wohnhaus für 12 Familien
System G
Geschosshöhen im Lichten 3,20 m



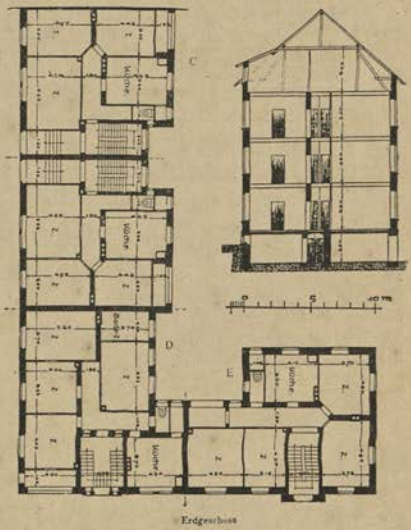
B



Wohnhäuser für je 3 u. 6 Familien
System A u. B
(Siehe auch Seite 80)



C



Wohnhäuser für je 3 Familien
System C, D und E
(Siehe auch Seite 49)

D

Blocks of Workmen's Dwellings at Essen.

A, Block dwelling for six families; B, Block dwelling for twelve families; C, Block dwelling for three or six families; D, Block dwelling for three families.

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